

**The Effects of Integrated Classroom-Based Physical Activity on On-Task
Behaviour for Indigenous Elementary School Students**

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By
Serene Thea Kerpan

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Abstract

The ability for school-aged children to stay on-task is crucial for success in school. One strategy to help children adhere to the expected behaviour of staying on-task is to increase opportunities for them to be physically active during class time. Physical activity that incorporates curricular content done in the classroom, known as integrated classroom-based physical activity, has been shown to improve on-task behaviour, increase physical activity, and teach curricular content simultaneously. Available research on integrated classroom-based physical activity and on-task behaviour is constantly expanding; however, there have been no studies yet with Indigenous children. The numerous benefits of integrated classroom-based physical activity may begin to address the complex problem of low academic attainment within Canada's fastest growing population, Indigenous Peoples. The first purpose of this research was to examine the effects of integrated classroom-based physical activity on the on-task behaviour of Indigenous children in kindergarten, grade one, grade four, and grade five. The second purpose of this research was to gather the perspectives of the teachers and students who took part in the integrated classroom-based physical activity interventions. **Study 1** utilized participatory action research methodology, which sought to engage teachers and school leaders in its design. On-task behaviour was assessed through direct observation with grade four and five participants at Whitecap Elementary School on Whitecap Dakota First Nation. Results indicated that the integrated classroom-based physical activity intervention may have been effective in improving the on-task behaviour of the participants. However, there was a regression to the mean issue that limited the findings. **Study 2** built on the findings of study 1 and applied the same study design and methods with kindergarten and grade one participants at Whitecap Elementary School. The relationship between integrated classroom-based physical activity and on-task behaviour has not been investigated with this age group. Results indicated that the integrated classroom-based physical activity intervention was effective in improving the on-task behaviour of the participants. **Study 3** gathered the perspectives of both teachers from study 1 and study 2 along with the perspectives of the grade four and five students

who took part in study 1 through the use of qualitative methods. This study included teacher interviews and one student focus group. Four themes emerged from the interviews with the teachers and students. These themes reveal the importance of physical activity on academic performance, classroom management issues, the need to tailor classroom activity, and the students' desire for competition and enjoyment of integrated classroom-based physical activity. Results from this mixed-methods research provide evidence that on-task behaviour is improved with integrated classroom-based physical activity for Indigenous students. Furthermore, qualitative findings present the barriers and facilitators to providing integrated classroom-based physical activity for elementary Indigenous students.

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Dedication

I dedicate this dissertation to my son Orrin. Orrin has provided me with the motivation to succeed, and filled my heart with a quantity of love I did not think possible.

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List of Abbreviations

ANOVA – Analysis of variance

ICBPA – Integrated classroom-based physical activity

SD – Standard deviation

List of Definitions

Accelerometer – An accelerometer is a movement-monitoring device worn to assess quantity of physical activity and intensity of physical activity.

Classroom Teacher – The term classroom teacher refers to a generalist teacher who is responsible for teaching all subjects for their class.

Combined Class – A class with one teacher that teaches two grades because of low student numbers in those respective grades.

Indigenous Peoples – The term Indigenous Peoples is an inclusive term that globally represents descendants of those who inhabited a geographical region prior to colonization (First Peoples Worldwide, 2016). In this research the term Indigenous is used when discussing all Aboriginal groups in Canada: First Nations, Métis, and Inuit (Constitution Act of Canada, 1982). However, when directly citing other authors I will use the terms they have used.

Integrated Classroom-Based Physical Activity – Classroom-based physical activity that integrates academic content. Occurs when educators integrate curricular material into the movement so that the students are learning material from academic subjects while being physically active.

On-Task Behaviour – Behaviour that follows the class rules and is appropriate to the learning situation. Operationalized definitions of on-task behaviour for data collection can be found in Appendix G.

Physical Activity – Intentional, voluntary movement directed towards achieving an identifiable goal (Newell, 2011).

Chapter 1

Introduction and Review of the Literature

1.1 Introduction

Physical activity is a fundamental component in the healthy growth and development of children (Jansen & Leblanc, 2010). Not only does physical activity promote muscular and skeletal growth, it aids in the prevention of chronic disease in childhood and later in life (Jansen & Leblanc, 2010). Physical activity is also important for psychosocial health, improving self-esteem, reducing depression and anxiety, while supporting learning and brain development. Research looking specifically at learning, academic performance, and physical activity conducted over the past decade, indicates that physical activity positively affects academic related outcomes such as standardized tests, executive functioning, on-task behaviour, and school enjoyment (Webster, Russ, Vazou, Goh, & Erwin, 2015).

This increase in knowledge on the effect of physical activity on learning has stimulated some teachers to incorporate physical activity into their classroom. Teachers integrate academic content with movement in their classrooms so students can learn material from their academic subjects while being physically active (Webster, 2015). This integrated classroom-based physical activity (ICBPA) approach has been shown to improve elementary age children's ability to stay on-task in four studies (Carlson et al., 2015; Grieco et al., 2009, Ma, Le Mare, & Gurd 2014; Mahar et al., 2006). On-task behaviour is defined as behaviour that follows the class rules and is appropriate to the learning situation (Mahar et al., 2006). Staying on-task is crucial for learning; it is not subject or content specific and it is a precursor for learning (Greenwood, Horton, & Utley, 2002; Mahar et al., 2006; Marks, 2000).

Enhancing the ability to learn is of particular interest to those who work with Indigenous children. In Canada Indigenous Peoples are the fastest growing demographic (Statistics Canada, 2012); they also fall behind in most indicators of academic success (Friesen & Krauth, 2009; Mushquash & Bova, 2007). Available evidence indicates that

starting in the elementary years Indigenous children begin falling behind their non-Indigenous counterparts in academic achievement (Friesen & Krauth, 2009; Steeves, Car-Stewart, & Marshall, 2010). Indigenous and non-Indigenous leaders are in agreement that increasing the quality and level of education for Indigenous children in Canada is paramount (The Truth and Reconciliation Commission of Canada, 2015).

In Saskatchewan, the Ministry of Education, school administrators, and Indigenous community leaders are dedicated to working together to increase efforts to be responsive to the needs of Indigenous students (Saskatchewan School Board Association, 2009). School leaders at Whitecap Dakota First Nation in Saskatchewan, Canada, affirm this declaration of improving Indigenous child learning. In 2012 I began collaborating with school leaders and teachers to explore ways in which physical activity could enhance student learning. Through meaningful collaboration with school administration and teachers we designed and conducted three studies, which are presented in this dissertation. The purpose of our research was to examine the effect of ICBPA on on-task behaviour for Indigenous children attending Dakota Whitecap Elementary School and to understand the perceptions of the teachers and students involved in this work.

The following section provides a review of the literature and rationale for the research. The research questions and hypothesis complete this first chapter. The following three chapters (Chapter 2, 3, & 4) are three separate, but interrelated, manuscripts describing the three studies I completed in collaboration with Whitecap Elementary School. In between each manuscript is a section that bridges the two manuscripts together and guides the reader from the previous manuscript to the next. The final chapter (Chapter 5) provides a general discussion that weaves together the findings from the three studies and offers concluding thoughts that span the breadth of this work.

1.2 Classroom-Based Physical Activity

Children spend most of their day at school, and thus the school setting is an ideal place to provide children with opportunities to be physically active. This potential, however, is often not realized due to time and budgetary constraints placed on educators and administrators (Vazou, Gavrilou, Mamalaki, Papanastasiou, & Sioumala, 2012).

Furthermore, as the pressure for academic achievement increases, time for physical activity is further reduced (Rasberry et al., 2011). Physical activity is often seen as being in conflict with academic achievement, and is one of the first things removed when academic performance is waning (Donnelly & Lambourne, 2011). Due to these constraints, schools are frequently places where sedentary lifestyles prevail as children spend between six and eight hours a day in non-active academic instruction (Donnelly & Lambourne, 2011). Although physical education classes can combat the amount of sedentary behaviour in schools, the reality is that often children spend less than half of their physical education class time in moderate to vigorous physical activity (Levin, McKenzie, Hussey, Kelder, & Lytle, 2001). However, it should be noted that when children are taught physical education by physical education specialists students achieve significantly more moderate to vigorous physical activity time (Telford, Olive, Cochrane, Davey, & Telford, 2016).

Teachers are generally supportive of providing opportunities for physical activity; however, they are challenged in finding the resources to implement movement and making the time to do so (Norris, Shelton, Dunsmuir, Duke-Williams, & Stamatakis, 2015). In response to this issue, researchers and educators have collaborated to study physical activity that occurs in the classroom as classroom physical activity does not require scheduling gym time, it can be done in short bouts, and time is not lost getting students ready to go to another location to engage in physical activity (Bartholomew & Jowers, 2011).

Classroom-based physical activity is short bouts of physical activity done in school classrooms (Riley, Lubans, Morgan, & Young, 2015). Classroom physical activity is also known as movement integration (Webster et al., 2015) or physical activity breaks (Delk, Springer, Kelder, & Grayless, 2014; McMullen, Kulinna, & Cothran, 2014). Classroom physical activity occurs when students are physically active for one to 15 minutes at varying degrees of intensity in their classroom (Bartholomew & Jowers, 2011; Donnelly & Lambourne, 2011; Grieco et al., 2009; Mahar et al., 2006; Webster et al., 2015) The intention of classroom physical activity is not to replace physical education,

but to supplement it by providing children additional opportunities to move during the school day (Webster et al., 2015).

There are numerous benefits associated with classroom physical activity. Multiple studies have shown that classroom physical activity significantly increases total daily physical activity levels, including providing bouts of moderate and vigorous physical activity (Bartholomew & Jowers, 2011; Erwin, Beighle, Morgan, & Noland, 2011; Goh et al., 2014; Mahar et al., 2006; Stewart, Dennison, Kohl, & Doyle, 2004). For example, Mahar and colleagues, (2006) found that students taking part in a classroom physical activity intervention who wore pedometers took significantly more steps while at school. In Stewart and colleagues research (2004), participants who took part in classroom physical activity and wore accelerometers accumulated several minutes of moderate and intense physical activity during 10-minute classroom-based physical activities. In another study (Goh et al., 2014), findings illustrated that participants in a classroom physical activity intervention who wore accelerometers increased their moderate-to-vigorous intensity physical activity by two minutes per day from baseline to the end of the twelve-week intervention. Examining the different quantities and intensities of physical activity acquired during classroom-based physical activity interventions is important so that support exists for the premise that classroom-based physical activity does make meaningful differences in children's physical activity levels. The use of accelerometers is ideal as they can measure activity intensity, a crucial measure of physical activity (Norris et al., 2015).

In previous studies, classroom-based physical activity has resulted in positive influences on body mass index. In a study (Donnelly & Lambourne, 2011) conducted over a three-year period, body mass index increased less from baseline to three years for participants with greater than 75 minutes of classroom physical activity per week compared to students with less than 75 minutes of classroom physical activity per week. Liu and colleagues, (2008) found that elementary age girls who took part in a classroom-based physical activity intervention over one school year had a significant reduction in overweight and obese status compared to those in the control group.

The effects of classroom-based physical activity on daily physical activity levels are important because of the opportunities it provides for children to receive associated health benefits. Children who are physically active develop healthy bones and muscles, reduce the risk of developing chronic diseases, improve self-esteem, and reduce stress, anxiety, and depression (Janssen & Leblanc, 2010). Furthermore, the greater the amount of physical activity, the greater the health benefits (Colley et al., 2011). Unfortunately, the majority of Canadian children are not experiencing the health benefits of physical activity, and a growing body of evidence reveals that the health of Canadian children is deteriorating (Coley et al., 2012; Leitch, 2007). Classroom-based physical activity may be one way to aid in increasing Canadian children's physical activity levels.

Classroom-based physical activity has been shown to enhance academic performance and learning behaviours. Four studies have confirmed that classroom-based physical activity improves children's ability to stay on-task (Carlson et al., 2015; Grieco et al., 2009; Ma et al., 2014; Mahar et al., 2006). Test scores are positively affected by classroom-based physical activity. In two studies, one with fourth and fifth grade students and another with second grade students, math scores were higher after their respective 10-minute and five-minute classroom physical activity intervention compared with a sedentary group and pre-test scores (Howie, Schatz, & Pate, 2015; Maeda & Randall, 2003). Results from a large three-year multi-school intervention showed that elementary students who received a classroom-based physical activity intervention had better standardized test scores on reading, writing, mathematics, spelling, and oral language skills than those in the control group (Donnelly & Lambourne, 2011). One study also looked at the effect of classroom-based physical activity on cognitive performance as measured by psychometric tests in six elementary schools (Hill et al., 2010). The psychometric tests placed a high demand on participants' executive functions. Results showed that classroom-based physical activity significantly improved the students' cognitive performance (Hill et al., 2010). Other academic benefits of classroom-based physical activity are increased enjoyment in the classroom setting and increased

perceived competence and effort in the classroom (Howie, Newman-Norlund, & Pate, 2014; Spyridoula, Vazou et al., 2012).

In regards to the logistics of implementing classroom-based physical activity, there are also benefits. Classroom-based physical activity can be easier to implement than other types of physical activity because it can be inserted into the school day, it is done in the classroom, and it requires minimal or no equipment. Lastly, the students do not need to get changed into gym clothes or outdoor attire such as snowsuits or boots, which can minimize activity time.

Many national organizations have become aware of these synergistic benefits and have begun recommending classroom-based physical activity (Active Living Research, 2016, Centers for Disease Control and Prevention, 2013; Institute of Medicine, 2013). Moreover, classroom-based physical activity is now seen as promising practice for inclusion in comprehensive physical activity school programs and interventions (Naylor, Macdonald, Zebedee, Reed, & McKay, 2006; Russ, Webster, Beets, & Phillips, 2015). The ability to capture the health benefits of increased physical activity while at the same time improving academic outcomes, without leaving the classroom, is appealing to teachers who want to help their students grow to be healthy and successful in school (Webster et al., 2015).

1.2.1 Types of Classroom-Based Physical Activity

Classroom-based physical activity interventions vary in their length of delivery, type of activity, and the ages of participants. In previous studies examining classroom-based physical activity, interventions ran from one week to three years, with the majority being less than eight weeks long. Classroom physical activity was typically delivered once daily. The length of the classroom-based physical activity intervention was between 4 and 20 minutes with the majority being 10 minutes in length. The vast majority of participants in previous interventions were in grades one through eight with most being in grades three and four.

There are many varieties of classroom-based physical activity. Classroom-based physical activity can be either pre-packaged programs that provide the educators with all the resources they need to integrate activity in the classroom or programs developed by teachers. There are also two main types of classroom-based programs in respect to their goals. The first one is classroom-based activity that has the primary goal of providing opportunities for the children to move but does not integrate academic content. Classroom-based physical activity that does not integrate academic content is often used to break up sedentary time, give children a break from their lessons, and increase daily physical activity. Programs with these goals include: Instant Recess (Woods, 2011), Activity Bursts in the Classroom for Fitness (Katz et al., 2010), Just-a-Minute (Vazou & Vlachopoulos, 2014), Physical Activity Across the Curriculum (Donnelly & Lambourne, 2011), Brain BITES (Howie et al., 2014) and Bizzy Breaks (Murtagh, Mulvihill, & Markey, 2013).

The second type of classroom-based physical activity is physical activity that integrates academic content with movement. Classroom-based physical activity that integrates academic content occurs when educators integrate curricular material into the movement so that the students are learning material from academic subjects while being physically active (Bartholomew & Jowers, 2011; Donnelly & Lambourne, 2011; Grieco et al., 2009; Mahar, 2011). The advantage of this type of classroom-based physical activity is that students experience increased physical activity while reinforcing content and improving learning outcomes (Norris et al., 2015). This allows for the preservation of time allotted to academic instruction because academic instruction also happens while the children are active (Bartholomew & Jowers, 2011). There are different terms for this type of classroom-based physical activity, however; for consistency in this dissertation this type of classroom-based physical activity will be called integrated classroom-based physical activity (ICBPA). Examples of ICBPA include Energizers (Mahar et al., 2006), Take 10! (Stewart et al., 2004), Texas I-CAN (Grieco et al., 2009), and Move-to-Improve (Dunn, Venturanza, Walsh, & Nonas, 2012).

Only one study has examined the difference between the impact of the effect of classroom-based physical activity that integrated academic content and classroom-based physical activity that did not integrate academic content. Findings from Vazou's (2014) study showed there was a greater improvement in math scores for the students exposed to the classroom-based physical activity that integrated academic content. It is for this reason, and because ICBPA preserves time for academic instruction by including it within physical activity sessions, the research in this dissertation is focused on ICBPA.

1.2.2 Classroom-Based Physical Activity Gaps in the Literature

Despite the growth in this area of research, multiple gaps still exist. Previous studies on classroom-based physical activity have measured several outcomes and thus there are few studies on each of the specific outcomes that can be measured (e.g. academic motivation, time-on-task, standardized test, cognitive performance). Furthermore, previous interventions vary greatly in design, making it challenging to come to any conclusions about a dose response relationship (Norris et al., 2015). More research is needed on each outcome variable, intervention type, and length of intervention in order to begin to understand dose response and possibly set benchmarks for success (Webster et al., 2015). Descriptive research is also needed to understand the experiences of teachers and students involved in ICBPA. Learning from teachers and students involved in ICBPA aids in the promotion of future ICBPA programs because such learning can result in a better understanding of what the barriers are to successfully using ICBPA and what may potentially facilitate ICBPA (Webster et al., 2015).

Previous work has also not addressed the identities of their participants (Rasberry et al., 2011). Many studies do not explain who their participants were in regards to their ethnic composition, while the studies that do give better descriptions of their participants identify them as primarily Caucasian. Different cultural groups have distinctive values and beliefs, particularly around physical activity, that may vary from other cultural groups (Kerpan & Humbert, 2015). The values a person or group hold about physical activity affects how physically active they are and whether they promote physical activity

to others, such as students or children (Kerpan & Humbert, 2015; Webster et al., 2015). The same holds true for values around learning and academic performance (Musquash & Bova, 2007; Preston, 2015). Thus it is important to investigate whether ICBPA is of value to different cultures and if so, how might it be implemented in a way that harmonizes with beliefs and behaviours of that specific group. Moreover, researchers have yet to ask groups of people from different cultures if the outcomes measured in respect to ICBPA are important to them, and thus worth investigating within their community.

1.3 Indigenous Peoples

The term Indigenous Peoples is an inclusive term that globally represents descendants of those who inhabited a geographical region prior to colonization (First Peoples Worldwide, 2016). There is no one definition of Indigenous Peoples, but there are global characteristics associated with the term, such as, descending from pre-colonized inhabitants in a specific geographical area, maintaining close ties to the land, and suffering from economic and political marginalization (First Peoples Worldwide, 2016). In this dissertation, the term Indigenous is used to represent all Aboriginal groups in Canada: First Nations, Métis, and Inuit (Constitution Act of Canada, 1982). If a certain group (First Nations, Métis, or Inuit) is specifically being referred to, as defined by the Canadian Constitution, or research pertaining solely to that group is being discussed, then that group's particular name will be used.

Differences within Indigenous Peoples in Canada are related to ethnicity (First Nations, Métis, Inuit, and those with or without registered treaty status), geography (remote, rural, on-reserve, urban), and jurisdiction (federal, provincial, tribe, band) (Smylie & Anderson, 2006). There is a rich diversity of social, economic, political, and environmental circumstances that form important variances in Indigenous communities (Waldram et al., 2006). The Indigenous population in Canada is growing rapidly. Between 2006 and 2011, the population of Indigenous Peoples in Canada increased by 20%, compared to the 5% for the non-Indigenous population (Statistics Canada, 2012). In Saskatchewan 20% of children under 14 are Indigenous (Statistics Canada, 2012).

1.3.1 The Health and Academic Attainment of Indigenous Peoples

Indigenous Peoples in Canada are a group that is diverse in their health. Some First Nation communities have better health outcomes than the Canadian average. This was illustrated in the work by Chandler and LaLonde (1998), who found that in many First Nation communities in British Columbia there were lower rates of suicide compared to the national average. Nonetheless, when compared to the Canadian population as a whole, Indigenous Peoples bear a disproportionate burden of health issues. Leading experts affirm that available evidence illustrates that there is a high rate of both chronic disease and mental health issues among Indigenous Peoples (Kirmayer, Simpson, Cargo, 2003; Reading, 2009). Overweight and obesity rates are high and potentially rising (Kolahdooz, Sadeghirad, Corriveau, & Sharma, 2015). The second phase of the First Nations Regional Health Study found that the number of children living in First Nations communities who were categorized as obese and overweight increased from 58.5% in 2002 (Phase 1) to 62.3% in 2008 (Phase 2) (First Nations Information Governance Centre, 2012). Physical inactivity is one factor that contributes to the high rate of obesity (Katzmarzyk, 2008).

Education is a key determinant of health for all people. Higher education leads to more employment opportunities, higher wages, better housing, better nutrition, and better access to health resources (Loppie Reading & Wein, 2009). Poor literacy often accompanies lower education attainment and with this lack of literacy comes a diminished ability to acquire information about nutrition, where to seek employment and housing, and what type of health care resources are required when you are unwell (Loppie Reading & Wein, 2009). Lower education is also associated with less employable skills, which results in lower paying jobs or unemployment, which further reduces access to housing, nutrition, and health resources because of financial barriers (Loppie Reading & Wein, 2009).

This relationship between education and health is stronger for Indigenous Peoples compared to non-Indigenous people (Marmot, 2005). Indigenous Peoples fall behind in most indicators of academic success including level of education attained (Friesen &

Krauth, 2009; Mushquash & Bova, 2007). The high school non-completion rate for Indigenous Peoples living on-reserve in Canada is approximately 61% in Canada (Statistics Canada, 2013). Despite a young and growing Indigenous population, there is a lack of data measuring the educational progress of Indigenous children (Canadian Council on Learning, 2009). There are no national data available on the educational outcomes of Indigenous elementary school children (Canadian Council on Learning, 2009), but provincial and school-level data from off reserve schools indicate that a large achievement gap exists between Indigenous children and non-Indigenous children (Friesen & Krauth, 2009; Steeves et al., 2010).

A concerning aspect of the low academic attainment issue is the lack of empirical research on what contributes to academic success for Indigenous children (Baydala et al., 2009; Rasmussen, Baydala, & Shennan, 2004). To help Indigenous children succeed, it is important to develop a better understanding of what contributes to academic achievement in addition to measures of intelligence. Standard measures of intelligence are not often strong predictors of academic success for both Indigenous and non-Indigenous children (Baydala et al., 2009). However, a review of the literature indicated that standardized measures of intelligence consistently correlated lower with achievement for Indigenous students compared to non-Indigenous children (Mushquash & Bova, 2007). This low correlation is because intelligence is defined by the culture it is intended to measure (Mushquash & Bova, 2007).

Furthermore, it is important to understand that examining the predictors of academic failure does not necessarily help children become academically successful. Literature is available indicating why Indigenous students are unsuccessful academically. For example, Indigenous students who have challenging transitions from one school to another, move schools often, have low parent involvement, lack qualified and engaged teachers, and experience early school challenges are more likely to be unsuccessful in school (Congress of Aboriginal Peoples, 2010). Although this is important information there have been few studies that seek to address those issues with solutions (Congress of Aboriginal Peoples, 2010). There is evidence for strategies that prevent high school

students from leaving school, such as the development of strong relationships with teachers, parent and family engagement, early education intervention, relevant content, choice in educational programming, and connection to Indigenous role models (Congress of Aboriginal Peoples, 2010). However, these broad approaches are not necessarily teaching methods that can be used in the classroom. It is important that educators of Indigenous students have several tools in their teaching tool box as there are many kinds of learners and many different things to learn in every classroom (Canadian Council on Learning, 2009).

1.3.2 Research with Indigenous Peoples

In 2015 The Truth and Reconciliation Commission of Canada filed its final report after traveling across Canada for six years to listen to the individuals, families, and communities that had been affected by the Residential School System. For over 100 years in Canada, Indigenous children were removed from their families and communities and placed in often-distant Residential Schools as a method of colonization (The Truth and Reconciliation Commission of Canada, 2015). The Commission described the purpose of the Residential Schools as a way “to weaken family ties and cultural linkages, and to indoctrinate children into a new culture – the culture of the legally dominant Euro-Christian Canadian society” (The Truth and Reconciliation Commission of Canada, 2015). Children were abused sexually, physically, and emotionally in Residential Schools (The Truth and Reconciliation Commission of Canada, 2015). These atrocities have left a devastating legacy, and the effect is still seen in Indigenous communities and in the relationship between Indigenous Peoples and non-Indigenous people. The inequity and disadvantage caused by colonization and the residential school system is still very visible in the education outcomes of Indigenous children (Preston et al., 2012).

An overarching goal of The Truth and Reconciliation Commission of Canada was to forge the important path to reconciliation for all people in Canada (The Truth and Reconciliation Commission of Canada, 2015). Reconciliation requires rejecting paternalistic and racist mindsets while committing to developing a relationship based on

mutual respect (The Truth and Reconciliation Commission of Canada, 2015). Within the Calls to Action in the report there is the request that both Indigenous and non-Indigenous communities and leaders work together to seek ways to eliminate the education gap between Indigenous and non-Indigenous Canadian children (The Truth and Reconciliation Commission of Canada, 2015). Addressing the current issues that affect Indigenous children's education is an important step in rectifying the injustices of the residential school system and colonization.

When Indigenous communities and non-Indigenous partners work together to investigate ways to reduce the education gap it is important to ensure that the outcomes are of value to the Indigenous community (Mushquash & Bova, 2007). Often in research, Indigenous communities are constrained to the investigation of variables that are seen as important in Western culture and their beliefs and values are not integrated into the research process (Oosman, Smylie, Humbert, & Henry, 2016). Community engagement is a process that develops interaction between researchers and Indigenous communities and can assist in ensuring outcomes align with community values and beliefs (Canadian Institutes of Health Research et al., 2014).

Community engaged research is based on having respectful relationships, reciprocity, and collaboration. Building reciprocal and trusting relationships is important as it affirms the respect that each party has for the knowledge that one another brings to the research project. Reciprocal and trusting relationships also promote an equal distribution of power (Canadian Institutes of Health Research et al., 2014). This is important because in most research done in the past with Indigenous Peoples the researchers retain the majority of the power and the community received very few benefits (Baum, McDougall, & Smith, 2006). The landscape of research involving Indigenous Peoples is rapidly changing for the better, but it is important to recognize that there have been grave injustices done to Indigenous Peoples in the name of research (Smith, 1999).

Another important aspect of community engaged research is respect for the community customs and codes of practice for research. Indigenous communities are

unique in many ways, including how they engage in research. The degree of collaboration can be different depending on the community protocols and the nature of the research (Canadian Institutes of Health Research et al., 2014). The variety of community involvement can range from active engagement to no objection to research being conducted in their community (Canadian Institutes of Health Research et al., 2014). The processes can include formal leadership review, joint planning, involving an advisory group, and formal partnership through research agreements (Canadian Institutes of Health Research et al., 2014).

By working with Indigenous communities through community engaged processes the principals of ownership, control, access, and possession (OCAP) can be realized (First Nations Information Governance Centre, 2016). OCAP is defined as Indigenous Peoples having control over data collection processes in their communities and control over the storage and use of that data (First Nations Information Governance Centre, 2016). The key features of community engaged research, respectful relationships, reciprocity, and collaboration, assist in ensuring OCAP principles are upheld because research decisions are made together with the best interest of the community in mind (First Nations Information Governance Centre, 2016).

1.3.3 Participatory Action Research

Participatory action research (PAR) was the specific methodology that informed the research in this dissertation. PAR encompasses the principals of community engaged research with the addition of an emphasis on change and action (Baum et al., 2006). Kurt Lewin, who is often referred to as the father of participatory action research, began working with minority groups in the 1930's on research that assisted in improving their self-esteem, which he believed would help them seek out equality in the work force and society at large (Adelman, 1993). One of Lewin's goals was to assist minority groups in overcoming colonization and the exploitation that accompanied it (Adelman, 1993). Lewin was amongst the first to utilize methods that included ordinary people making research decisions (Adelman, 1993). Paulo Freire, another pioneer of PAR, was an adult

educator who worked with marginalized groups in Brazil to challenge traditional forms of social power and education (Baum et al., 2006). His primary concern was poverty and the education of those in poverty (MacDonald, 2012). Freire worked with impoverished groups to analyze the structural reasons for their marginalization and poverty (MacDonald, 2012). Critical reflection was a pivotal feature of Freire's work, his famous statement that "reflection without action is sheer verbalism or armchair revolution and action without reflection is pure activism, or action for action's sake" is still an important aspects of PAR.

Today, PAR, is a research methodology that is well suited to research with Indigenous Peoples (Oosman et al., 2016). PAR emphasizes working with communities to enable actions that improve outcomes that are of importance to that community (Baum et al., 2006). Partnership with communities is at the heart of participatory action research; a partnership based on both parties having valuable knowledge, not just the researcher (McIntyre, 2008). By engaging in the community the researcher shows commitment to the community; this is a key step in balancing power and overcoming professional dominance (Baum et al., 2006). These facets of PAR align with Indigenous worldview because both are centered on the importance of relationships and community collaboration, the notion of coming together to help one another (Hart, 2010). An important element of Indigenous worldview is reciprocity, and the belief that as we receive from others we must give (Hart, 2010). Reciprocity is a dominant trait of PAR, often one gains entry into a community to engage in research through giving back and showing a commitment to the community (Hart, 2010).

The process of PAR is often described as a spiral of planning a change, acting and observing a change, reflecting on the processes and consequences, and then re-planning with the goal of acting and observing again (Kemmis & McTaggart, 2000). In practice however PAR does not usually have such defined categories, there is often overlap of stages and changes in plans that are responsive to knowledge and experience acquired as the research is happening (Kemmis & McTaggart, 2000). Success in PAR is not measured by how closely the participants followed the exact steps laid out in the research

plan, but by whether the participants and the researcher have developed their practices and understand their practices better (Kemmis & McTaggart, 2000).

The research presented in this dissertation is one cycle of PAR, including the stages of planning a change, acting and observing a change, and then reflecting on the processes and consequences of actions. The subsequent section will detail the genesis of the research by describing the process of working with an Indigenous community to develop two intervention studies, conduct the two intervention studies, and then reflect on the interventions through a qualitative study.

1.4 Community Description

The research in this dissertation was conducted in collaboration with Whitecap Elementary School on Whitecap Dakota First Nation. Whitecap Dakota First Nation is located on a reserve 30 km south of Saskatoon, Saskatchewan. The First Nation has 600 members, 450 of which live in the community. Whitecap Dakota First Nation strives for economic success and self-sustainability (Eichler, 2016; Whitecap Dakota First Nation, 2016). Notable landmarks within the community include the Dakota Dunes Casino and Golf Club, the Whitecap Health Centre, and the Whitecap Elementary School.

The elementary school has 79 students and enrolls students from pre-kindergarten through grade six. There is one class per grade or in some cases combined classes of two adjacent grades, for example, a combined class of grade four and five students. The school day is from 8:50am to 3:15pm. Teachers follow the Saskatchewan Ministry of Education Curriculum, which contains curricula, professional and instructional support materials, outcomes, and lists of recommended resources to be followed and used by schools and teachers throughout Saskatchewan (Ministry of Education, 2010). Following the completion of grade six, students are bussed into Saskatoon to complete their grade seven and eight education. High school students have the option for transportation from Whitecap First Nation to Bedford Road Collegiate or Mount Royal Collegiate to attend high school.

1.4.1 Genesis of the Study

I believe it is important to position myself in this work by explaining who I am and how my background informed this research. I am a white woman and my education background is in physical activity and history. During my undergraduate degree I majored in history and in a physical activity program that focused on sport, health, and physical education. Although my undergraduate program had a strong focus on physical education, I am not certified as a teacher. While in my first years of university I became interested in working with Indigenous youth because of the opportunities I had to learn about Indigenous Peoples in both my history and physical activity courses. This interest led me to a summer position as a Sport Coordinator for the Aboriginal Sports and Recreation Association of British Columbia. In this role, I collaborated with many First Nation communities in British Columbia on sport programming. In the final year of my undergraduate program I enrolled in a research course where I worked with Indigenous youth athletes to identify their fitness levels.

My undergraduate work and research experiences led me to graduate school at University of Saskatchewan, where I focused on working with Indigenous youth in a school setting. During my master's program I spent a year working in an Indigenous high school examining Indigenous youth beliefs on physical activity. I also began teaching post-secondary classes during my master's program. My time spent with Indigenous youth in a school setting and my recent experience teaching fostered an interest in pedagogy. For my doctoral work I decided that I wanted to weave together my related interests of physical activity, working with Indigenous youth, schools, and pedagogy. Bringing these passions together resulted in development of this research investigating ICBPA and on-task behavior with Indigenous children.

Through the use of community engagement methods, the three studies in this dissertation were designed and conducted. I began the research process by engaging in meetings with all of the school leaders and teachers at Whitecap Elementary School to learn more about their school and to understand their viewpoints on physical activity, student needs, behaviour, and learning outcomes. Approximately two-thirds of the

teachers and administrators were non-Indigenous, with the other third being Indigenous. None of the teachers or administrators lived in Whitecap First Nation, but many had taught at the school for years. School staff, including office staff, student support staff, and educational assistants were mostly Indigenous, many from the community. All of the teachers and administrators had education degrees and many of the teaching assistants had teaching assistant certification.

The meetings we had directed the development of the important features of this project, including topic selection, design, timeline, procedures, and measured outcomes. One important decision made during these meetings was to use on-task behaviour as the outcome to assess in the ICBPA intervention studies. On-task behaviour is “behaviour that follows the class rules and is appropriate for the learning situation” (Mahar et al., 2006). On-task behaviour was chosen by the teachers as the outcome to assess as they felt it was an important learning attribute to focus on. They believed it was relevant to Indigenous learners because on-task behaviour is the precursor to learning in all situations and contexts. Whether a student is learning math, reading, or their traditional language and culture they need to be on-task to learn (Greenwood et al., 2002; McClelland & Cameron, 2011; Rink, 2001).

We also decided that the kindergarten and grade one combined class and the grade four and five combined class would be ideal classes to work with for this project as they had larger class sizes, represented different age groups in the elementary school setting, and had teachers who were interested in participating. Through collaboration, the teachers involved, the principal, and I decided that we would run the ICBPA interventions in these two classes and assess the effect on on-task behaviour. We also decided that it would be valuable to gather qualitative data on perceptions of engaging in ICBPA from the teachers and students who participated in the interventions. All of the decisions we made as a group are reflected in the Community Research Agreement (Appendix F). The Whitecap Elementary School principal presented our proposed research to Whitecap Dakota First Nation Chief and Council at their regular monthly meeting. Chief and Council supported the research. The principal led this review and

approval process with Chief and Council because he was familiar with the community-level process.

Over the two-month planning period, I engaged in reciprocity with the school community by regularly volunteering to help at school events such as feasts and during recess and lunch with supervision. Throughout the winter and spring when I was collecting data, I volunteered with the two classes who took part in the interventions, working in a similar capacity as a teacher's assistant. In addition to helping in the classroom, I went on school field trips with both classes. These actions resulted in the development of trusting relationships throughout the school community and within the classes I worked with.

1.5 Research Questions and Hypothesis

The benefits of ICBPA are many and include improving multiple indicators of academic success and increasing daily physical activity. Not only is it important to assess the effects of ICBPA, it is equally important to examine the perceptions of the participants who participated in the ICBPA interventions. Understanding the perception of students and educators is crucial because it is unlikely that teachers will use ICBPA if they or their students perceive it negatively (Goh et al., 2013; McMullen et al., 2014). Moreover, it is important to understand the perceived barriers and facilitators to implementing ICBPA so that activities can be adapted to help teachers overcome those barriers and utilize available facilitators (Goh et al., 2013). Thus, the purpose of this dissertation was to examine the effect of ICBPA on on-task behaviour for Indigenous children and to understand the perceptions of teachers and students of ICBPA.

The following research questions guided this work:

- 1) Does ICBPA improve on-task behaviour for Indigenous elementary school children?

Hypothesis:

- a) The classroom-based physical activity intervention will increase on-task behaviour from immediately before the ICBPA to directly after the ICBPA during the active lesson intervention phase.

- b) On-task behaviour will be higher at the end of lesson in the active lesson phase than at the end of lesson in the non-active phase.
 - c) On-task behaviour will be lower at the end of the non-active lesson phase than at the beginning of the non-active lesson phase.
- 2) How much additional physical activity is accrued during ICBPA?
- Hypothesis: Physical activity during the school day (8:50am-3:15pm) will be higher in the active lesson phase than in the non-active phase.
- 3) What are the perceptions of the teachers who engaged in ICBPA?
- 4) What are the perceptions of the students who engaged in ICBPA?

Chapter 2: Study One

Kerpan, S, Humbert, L, Rodgers, C. (Unpublished). Improving On-Task Behaviour in Grade Four and Five Indigenous Students with the use of Integrated Classroom-Based Physical Activity.

Co-authorship: This manuscript was developed in collaboration with the committee members Louise Humbert and Carol Rodgers. Serene Kerpan had the primary role in the data collection, analysis, and writing of this manuscript. Drs. Humbert and Rodgers provided guidance, suggestions, and editorial input into the creation of this manuscript. This manuscript is currently being developed for publication. It is presented in a format acceptable for the requirements of a graduate dissertation.

2.1 Introduction

The health benefits of physical activity for children are numerous and have been widely investigated. It is known that children who are active develop healthy bones and muscles, have a reduced risk of developing chronic diseases, have improved self-esteem, and reduced stress, anxiety, and depression (Janssen & Leblanc, 2010). Physical activity has also been shown to improve the learning abilities and academic performance of children (Erwin, Fedewa, Beighle, & Ahn, 2012; Rasberry et al., 2011; Tomporowski, Lambourne, & Okumura, 2011).

Children spend most of their day at school, making it an ideal place to optimize the interrelated benefits of physical activity and academic performance. However, this potential is often not realized due to time and budgetary constraints limiting the inclusion of daily physical activity in the curriculum (Riley et al., 2015; Vazou & Vlachopoulos, 2014; Webster et al., 2015) and the [public] view that physical activity is in contradiction to academic achievement (Donnelly & Lambourne, 2011).

In an effort to maximize the positive link between physical activity, health, and learning, researchers and educators have collaborated to examine physical activity opportunities that occur in the classroom and integrate academic content. This combination of physical activity and academic content is known as integrated classroom-

based physical activity (ICBPA). ICBPA is built on the model of short activity periods within the traditional sedentary academic instruction period. During these periods, some type of physical activity occurs in the classroom that reinforces what is being taught in the lesson plan or curriculum (Donnelly & Lambourne, 2011). ICBPA has many positive outcomes; it increases physical activity, reinforces academic content, and positively enhances multiple measures of academic performance (Erwin et al., 2012; Grieco, Jowers, & Bartholomew, 2009; Mahar et al., 2006; Rasberry et al., 2011) all the while preserving the majority of the time allotted to academic instruction (Bartholomew & Jowers, 2011).

Many outcomes can be measured in response to ICBPA; of these, on-task behaviour may be one of the most valuable outcomes to assess (Greenwood et al., 2002; Marks, 2000; Mahar et al., 2006). On-task behaviour is behaviour that follows the class rules and is appropriate to the learning situation (Mahar et al., 2006). On-task behaviour is an outcome that is of great interest to most teachers as it is closely related to their goals as educators. When students are on-task the teacher can teach the curriculum (Mahar, 2011). On-task behaviour is also related to all aspects of learning and is not subject or content specific (Greenwood, 1991). Most importantly, a consistent pattern of not staying on-task, what is termed off-task behaviour “can lead to dysfunctional school behaviour, which can ultimately culminate in some students leaving school entirely” (Marks, 2000, p. 155). Of the few studies that have examined on-task behaviour and ICBPA, results have demonstrated a positive effect on on-task behaviour (Carlson et al., 2015; Grieco et al., 2009; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley et al., 2015).

To our knowledge, physical activity and outcomes associated with learning have not been studied specifically with Indigenous Peoples. Canadian Indigenous children as a whole are distinct in that they fall behind in most indicators of academic success (Friesen & Krauth, 2009; Mushquash & Bova, 2007). The national rate of high school non-completion for on-reserve Indigenous Peoples is approximately 61% (Statistics Canada, 2013). There is no national data available on the educational outcomes of Indigenous children in elementary school (Canadian Council on Learning, 2009). However, there is a

small amount of provincial off reserve data available on the topic. The Saskatchewan Ministry of Education Indicators Report in 2008 showed that Indigenous students in grade four ranked 20% lower in reading proficiency than their non-Indigenous counterparts (Steeves et al., 2010). Another study from British Columbia examining the academic success of Indigenous children and non-Indigenous children revealed a large gap in academic achievement between the two groups, most of which was present by grade four, and continued to grow between grades four and seven (Friesen & Krauth, 2009).

The need to close the academic achievement gap is great given the growth of the Indigenous population in Canada. The Indigenous population in Canada has increased by 20% over a five-year period, compared to 5% for non-Indigenous Canadians (Statistics Canada, 2013). Efforts to increase the academic achievement of Indigenous children are of great interest to educators, parents, and community leaders (Baydala et al., 2009; Saunders, 2011).

The academic achievement gap between Indigenous and non-Indigenous students is exacerbated by the lack of empirical research on the factors that may contribute to the academic success of Indigenous children (Baydala et al., 2009; Congress of Aboriginal Peoples, 2010). Education experts have noted that research is needed to better understand what factors, other than IQ, contribute to academic achievement for Indigenous children (Baydala et al., 2009; Canadian Council on Learning, 2009). There has also been a call for quality research to determine which instructional methods are best suited to Indigenous students (Rasmussen, Baydala, & Sherman, 2004). Although some literature is available on effective instructional methods for Indigenous children, the majority of this literature is not based on empirical research (Congress of Aboriginal Peoples, 2010; Rasmussen et al., 2004). Thus, the purpose of this study was to examine the effects of ICBPA on the on-task behaviour of Indigenous students. This research will contribute to existing empirical research on Indigenous children and learning behaviours and improve the limited evidence base on ICBPA and on-task behaviour. A secondary objective of this study was to assess the amount and intensity of physical activity the participants engaged

in during the non-active lesson period and the ICBPA intervention period.

2.2.1 Participants

This study was conducted in a grade four and five combined class at an on-reserve elementary school located half an hour from a large Canadian prairie city. The entire class of thirteen students (n=13) took part in ICBPA intervention; however, data were only collected on students who assented to participate in the study and whose parents provided consent. Thirteen students gave both assent and received parental consent (92% participation rate). Ethical approval for this study was acquired from the researcher's university ethics board and from the participating school's First Nation Council.

The mean age of the participants was 9.5 years old and 57% of the participants were male. The power calculation to determine sample size was done using G Power 3.1 (Faul, Erdfelder, Buchner, & Lang, 2009). An effect size of 0.6 was used in the calculation; this was based on previous work by Mahar (2006). Using α of 0.05 at 80% power, it was predicted that six participants were needed to yield a significant effect when combined with the repeated-measures design that allowed for a within-subjects factor with four levels that utilized the same participants in four measurements over time. Repeated measures designs increase statistical power for detecting a change and they allow for a more decisive assessment of within-person change over time (Guo, Logan, Glueck, & Muller, 2013).

The teacher of this grade four and five combined class is a First Nations woman who earned her education degree at a large Canadian university and had been teaching for seven years. She lived in a nearby city and commuted to the First Nation community to teach. This teacher had no prior experience or training in integrating physical activity into her classroom.

2.2.2 Procedure

A participatory action research (PAR) model was used for this study. PAR is community engaged research that shares power with, and engages community partners in the research process that aims to enact change and action (Baum et al., 2006; Israel et al.,

2005). The partnership between researchers and community partners in PAR is based on both parties having valuable knowledge, not just the researchers (Baum et al., 2005). Within the school-based physical activity and learning literature there have been few, if any, studies that have used a PAR model. A recent review concluded that research on classroom-based physical activity should be developed in consultation with educators because educators hold valuable knowledge on the students they teach (Rasberry et al., 2011). Likewise, when educators are involved in the development of interventions for their students, there is a much higher likelihood of sustainability for that intervention (Riley et al., 2016).

PAR was also an appropriate method for researching with an Indigenous community because it can produce relevant research that may enact change in a decolonizing way. The fundamental principles of PAR: shared power, collaboration, long-term engagement, and mutual benefits, all helped ensure this research was ethical and culturally appropriate for the Indigenous community involved in this study (Canadian Institutes of Health Research et al., 2014).

For this study, researchers and school leaders worked together from the beginning stages of designing the study to the final stages of determining what further actions should occur and how the results were used. This approach of involving participants in intervention designs is an emerging practice within health research, specifically with physical activity and school interventions that involve children and youth (Corder, Schiff, Kesten, & van Sluijs, 2015; Jago et al., 2011; Riley et al., 2016). A community research agreement was developed that outlined how both parties would work together to ensure the success of this project (Appendix F). From the onset of the study, the researcher, school leaders, and teachers agreed that the goal of their collaborative study would be to assess how physical activity affected on-task behaviour. One of the key decisions made in collaboration with school leaders and teachers was the choice to measure on-task behaviour as the dependent variable. During research decision-making meetings many academic measures were discussed as options for assessment. The teachers were asked to reflect on what measure would be most meaningful to them based on their experiences.

The teachers and school leaders stressed that on-task behaviour was an academic outcome of concern. They also confirmed that it was appropriate to measure on-task behaviour with Indigenous children because it is a universal skill necessary in all learning situations; whether the child is learning math, language, or cultural teachings they need to be on-task. This shared decision to assess on-task behaviour was important because decisions on testing instruments should be made with caution and involve open communication between the investigator and community or client (Mushquash & Bova, 2007).

2.2.3 Intervention

The ICBPA intervention was a series of physical activities that included curricular content. At the request of the teacher, the researcher led the activities. The First Nation teacher explained that she would feel more comfortable learning to use the activities by watching the researcher use them throughout the intervention phase. This facet of the study is favorable in regard to intervention fidelity. As the researcher was the individual leading the intervention activities, it was confirmed that the activities were actually utilized as intended. However, this aspect of the study did limit external validity. It is worth mentioning that after the intervention in a follow-up qualitative study the teacher explained she liked the process of learning through watching the researcher lead the ICBPA, she knew which activities the students liked best, and she felt confident in leading those activities in the future. She was also given a book of the activities to reference in the future.

The activities were taken from *Energizers*, developed by the Activity Promotion Laboratory in the Department of Exercise and Sport Science at East Carolina University (Mahar, Kenny, Shields, Scales, & Collins, 2010). In a previous study by Mahar et al., (2006), it was established that *Energizers* improved on-task behaviour for participants. Energizers are available free of charge from the East Carolina University Department of Exercise and Sport Science website (<http://www.ecu.edu/cs-hhp/exss/apl-projects.cfm>). Energizers have been developed for grades three through five and kindergarten through

grade two. The researcher suggested the use of *Energizers* to the teacher and school leaders involved in the study design because of their previous success in other studies. Another benefit of Energizers is that they require no equipment, other than basic classroom supplies such as paper, tape, and pens.

In the morning, before school started, the researcher and teacher would get together and pick out the Energizer activities for that day to ensure the content of the Energizers reflected the content being taught in the lessons. Other factors that affected our decisions on what Energizers to choose were student enjoyment and feasibility in the classroom. During the intervention, Energizers were used during classes where students were learning literacy skills such as reading and writing, or during social studies classes where students were learning about geography or history. In some cases, the activities had to be adapted to fit what the students were learning at the time so as to ensure they aligned with the curriculum, but the type of physical activity done remained the same. These variations are described at the bottom of the activities description in Appendix K. One common adaptation was making the activities competitive and team-based. At the request of the students, who liked competition, the class was often divided into two teams (e.g. boys vs. girls, left side of class vs. right side of class). Figure 2.1 is a photograph of the grade four and five participants playing *Hit the Deck* and Figure 2.2 is a photograph of the grade four and five participants playing *Litterbox*, both activities are described in Appendix K.

Figure 2.1 Grade four and five participants playing *Hit the Deck*



Figure 2.2 Grade four and five participants playing *Litterbox*



2.2.4 Assessment of On-Task Behaviour

The measurement of on-task behaviour was conducted according to the guidelines established by (Mahar, 2011). This required (a) accurately defining the behaviour so it can be measured reliably; (b) training observers to be objective and nonjudgmental; (c) ensuring inter-observer reliability prior to field research; (d) ensuring inter-observer reliability in the research data.

The definitions for on and off-task behaviour used for this study were similar to those used in previous research (Grieco et al., 2009; Mahar et al., 2006; Shapiro, 2011). The six categories used were: on-task motor, on-task verbal, on-task passive, off-task motor, off-task verbal, and off-task passive. Each of these six coding categories had specific operationalized definitions and a list of examples of behaviours. See Table 2.1 for definitions and examples of on- and off-task behaviours. After each observation period (discussed in subsequent section) a frequency count of how many times the individual participants were on and off-task was conducted. From that, a percentage of on-task behaviour was calculated. For example, if a participant was measured ten times in the observation period and six of those measures were of the three on-task categories (on-task motor, on-task verbal, on-task passive) then they were recorded as 60% on-task for that observation period.

Table 2.1

Definitions and Examples of On- and Off-Task Behaviours

Behaviour	Definition	Examples
On-task Verbal	Any time the student is verbally engaged in the topic being taught.	Asking questions related to their work, talking to others about the work, answering questions when requested to do so.
On-Task Motor	Any time the student is actively attending to the assigned task.	Writing, raising a hand, and leaving their desk for a reason applicable to the assigned task.
On-Task Passive	Any time the student is passively attending to the assigned task.	Listening to the teacher, looking at their work, listening to a peer talk about the assigned task.
Off-task Verbal	Any audible verbalizations that are not permitted or not related to the assigned task.	Talking to others about unrelated topics, making unauthorized comments, or noises.
Off-Task Motor	Any instance of motor activity that is not directly associated with the assigned academic task.	Reading or writing inappropriate or unassigned material, leaving the desk without receiving permission, physically touching other students.
Off-Task Passive	Any time a student is passively not attending to assigned academic task.	Gazing off, placing his head on the desk, looking at other students when not part of a given task.

A two-observer system was used for this study to ensure reliability of the results. The observers were a research assistant and myself. In a pilot phase, the two observers were trained to conduct the on-task measurement in another elementary school with the same age of students. The observers reviewed and memorized the data collection protocol and the operational definitions for each observational category (on-task motor, on-task verbal, on-task passive, off-task motor, off-task verbal, and off-task passive). The inter-rater reliability for the observers assessing on-task behaviour and off-task behaviour during training was found to be $Kappa = 0.615$ ($p < 0.001$), 95% CI (0.788, 0.442). This indicated there was substantial agreement between the observers. During data collection for the study, the second observer was present for 50% of the observations. The inter-rater reliability for the actual study observations was found to be substantial with $Kappa = 0.666$ ($p < 0.001$), 95% CI (0.701, 0.630).

2.2.5 Study Design

This study used a two-way, [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures design. The study was three weeks in length. The length of the study was dictated by the school's schedule; three-weeks was the longest period of time without a substantial break such as winter break, spring break, and Easter break. Moreover, there is no strong evidence available yet for a specific length of physical activity intervention that is successful at improving learning or learning behaviours. In previous research examining classroom-based physical activity, the interventions ran from one week to three years. Studies examining on-task behaviour specifically have ranged from three weeks to an entire school year. The three-week study by Ma and colleagues (2014) was successful at improving on-task behaviour. The three-week study was divided into one week of non-active lessons and two weeks of active lessons (intervention). A longer intervention phase was chosen to allow for more time for an intervention effect to take place.

During the non-active lesson phase, the teacher would teach through all of her lessons without any physical activity break during the lessons. Most lessons were approximately 45 minutes and covered one subject (e.g. spelling, and reading). Observations of on-task behaviour during the usual practice phase started five minutes into the lesson and continued for the next fifteen minutes. Starting five minutes into the lesson allowed the students the time to settle into regular instruction. After observing on-task behaviour for 15 minutes, observers would then take a five-minute break to replicate the time that the intervention would take in the following weeks. After the five-minute break, observation of on-task behaviour continued for another 15 minutes. Accordingly, there was a total of 30 minutes of on-task behaviour observation broken into two 15-minute time frames during the 45 minute classes. The two 15-minute observation blocks were chosen as it allowed for maximal observation time of on-task behaviour in the 45 minute class. Also, 15-minute observation blocks were used by Grieco et al., (2009) in a similar study on ICBPA and on-task behaviour. On-task behaviour was measured twice each day, once in the mid-morning class and once in the mid-afternoon class. During the

active lesson phase the same observation pattern was followed, however, there were five minutes of ICBPA between the two observation periods. All lessons were taught at the same time of day, covered the same academic subject, and were the same length in time in both phases.

Momentary time sampling was used to measure on-task behaviour. This requires that observers record what happens exactly at a predetermined moment (Hintze, Volpe, & Shapiro, 2002), and is a method that has been shown to give an accurate estimate of percentage time when sampling intervals of less than 30 seconds are used (Saudargas & Zanolli, 1990). The momentary time sampling interval length for this study was 10 seconds. During piloting, ten seconds was found to be an adequate amount of time to record the behaviour and locate the next participant listed on the on-task behaviour-recording sheet (Appendix H). Each observer wore a wireless headset that delivered a synchronized beep every ten seconds. At the moment the beep occurred the behaviour of the participant was recorded, and then the observer visually located the next participant on the list and waited for the next beep. Once all twelve participants were recorded, the observers would start again and record all the participants again. This pattern was continued until the 15 minutes were up.

2.2.6 On-Task Data Analysis

Mean on-task behaviour was calculated for the beginning of lesson and end of lesson in both the non-active lesson phase and the active lesson phase, resulting in four means. Off and on-task categories were collapsed into two categories, off-task and on-task. Group series means were used to replace missing data from participant absentees (Tabachnick & Fidell, 2013). All data was checked for normality and analyzed using SPSS 20.0. Significance was accepted at $p < 0.05$. A two-way, [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures ANOVA was used to observe for a significant interaction between time and phase as described in hypothesis 1. Paired t-tests were used to analyze main effects after a significant interaction was observed. The paired t-tests were used to analyze differences between

beginning of lessons in both the active and non-active phase, end of lessons in both the active and non-active phase, beginning of lesson and end of lesson in the non-active lesson phase, and beginning of lesson and end of lesson in the active lesson phase.

2.2.7 Physical Activity Data Collection and Analysis

Actical (version 2.12) accelerometers were worn [at the waist] to assess physical activity during this study. The Actical is a valid and reliable tool for assessing physical activity in children (Evenson, Catellier, Gill, Ondrak, & McMurray, 2008). Participants were given verbal instruction on how to wear them and when to wear them. The accelerometers were attached to a Velcro belt and worn on the left hip of each of the participants. The accelerometers were to be worn Monday through Friday from 8:45am to 3:15pm throughout the study. The accelerometers were kept in a basket in the classroom and the students were to put them on when they came to class in the morning and take them off before going home. The teacher was responsible for ensuring the accelerometers were distributed and collected each day. Fifteen-second epochs were used to collect the physical activity data as children's physical activity is spontaneous and intermittent (Evenson et al., 2008; Rowlands, 2007). There is a lack of uniformity on what establishes a valid wear day within the literature and there is considerable variability depending on the goals of the study (Rowlands, 2007). Previous studies examining ICBPA have required four and five hours of valid wear time during the school day (Carlson et al., 2015; Riley et al., 2015). Three or more hours of valid wear time in a day was necessary for data to be included in analysis in this study. Three hours was the chosen valid wear time as this was just over half the school day and would allow for the capturing of data from students who came late or left early.

Non-wear time was set at 60 minutes or more of successive zero counts (Carlson et al., 2015; Evenson & Terry, 2009). Participants needed to have four valid wear days within each phase to be included in the analysis (Trost, Pate, Freedson, Sallis, & Taylor, 2000). Having multiple valid wear days is important to capture a regular pattern of physical activity; if you only use one day you run the risk of that child doing far more or

less physical activity than they normally would do. Sedentary, light, moderate, vigorous or moderate-to-vigorous physical activity was classified by the use of Evenson cut points (Evenson et al., 2008) SAS software was used to extract the raw accelerometer data and structure it into data useful for analysis.

2.3 Results

A two way [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures ANOVA was conducted to determine if the classroom-based physical activity intervention was successful in improving on-task behaviour for participants. The analysis revealed a significant time x phase interaction [$F(1, 12) = 37.96, p < .001$] [Figure 1.1]. The partial eta-squared was $\eta^2 = .76$, indicating a large effect.

When the participants received no physical activity intervention half way through their lesson there was a significant decrease in their ability to stay on-task ($78.7\% \pm 6.1$ to $68.9\% \pm 9.8, p < .05$). This was in contrast to an improved ability ($65.1\% \pm 9.9$ to $78.7\% \pm 6.1, p < .001$) to stay on-task when the participants received a physical activity break half way through the lesson. There was also a significant difference ($p < .05$) in the end of lesson scores in the non-active lesson phase and the active lesson phase. During a lesson with no physical activity intervention the on-task behaviour percentage of the class was 68.9% for the last 15 minutes of the class. However, when the participants did receive the physical activity intervention the on-task behaviour percentage at the end of the class was 78.7%. The individual on-task behaviour scores for all participants are available in Appendix E. Mean on-task behaviour percentages are shown in table 2.2.

Table 2.2

Mean Percentages of On-Task Behaviour

Percentage of on-task behaviour	Non-active lessons		Active lessons	
	Beginning of lesson	End of lesson	Beginning of lesson	End of lesson
Mean	78.7	68.9*	65.1	78.7***
SD	6.13	9.8	9.9	6.1
Minimum	69.2	53.6	46.4	69.2
Maximum	91.76	84.4	78.5	91.8

*Differences in on-task behaviour were statistically significant, $p < 0.05$

*** Differences in on-task behaviour were statistically significant, $p < 0.001$

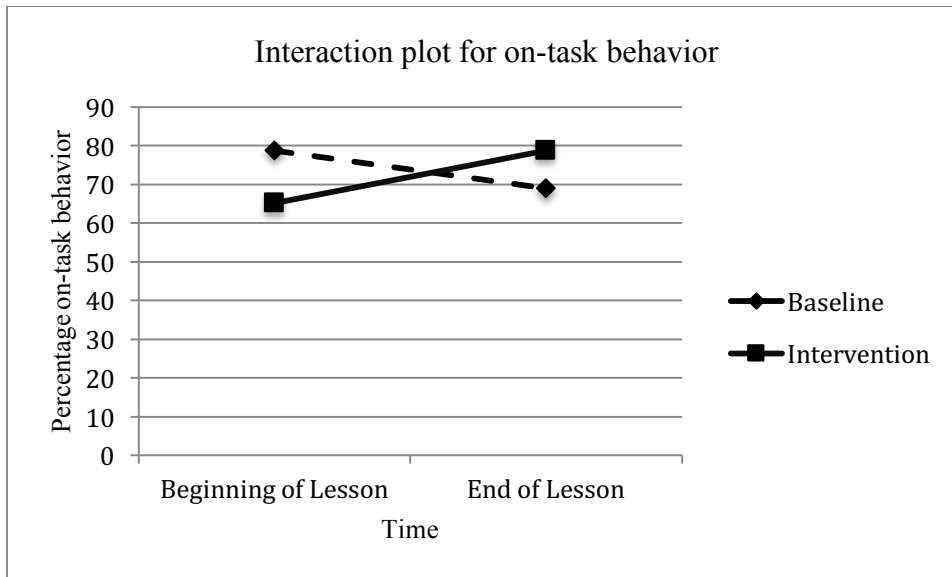


Figure 2.3. Interaction between phase and time predicting on-task behaviour for children in grades 4 and 5.

Accelerometer data was first analyzed for valid wear days to determine if further analysis of total physical activity and intensities of physical activity were warranted. In the non-active lesson phase the mean number of valid wear days was 3.18 days. In the active lesson phase the mean number of valid wear days was 2 days. On valid wear days

in the non-active lesson phase the accelerometers were worn for an average of 5.5 hours a day and in the active lesson phase the accelerometers were worn for an average of 4.83 hours. In both the non-active lesson phase and the active lesson phase there were not enough valid wear days [four] to warrant analysis. A mean of 3.18 and 2 valid wear days, respectively, is not representative of physical activity in children (Esliger, Copeland, Barnes, & Tremblay, 2005; Rowlands, 2007; Trost et al., 2000). Consequently, accelerometer data was not further analyzed and a comparison between physical activity data from the non-active lesson phase vs. active lesson phase is not possible to accurately ascertain.

2.4 Discussion

On-task behaviour is critical to student learning (Carlson et al., 2015; Greenwood, 1991). This study demonstrates that physical activity that occurs in the classroom and integrates curricular content may be a way to improve the on-task behaviours of Indigenous children. These findings are consistent with the literature available on ICBPA and on-task behaviour. Previous studies with similar designs and participant ages showed improvements in on-task behaviour in the range of 2% to 20%. Mahar et al., (2006) demonstrated an 8% increase in on-task behaviour when examining the effect of Energizers in grades three and four students, while Grieco et al., (2006) only showed a slight increase of 2% in on-task behaviour after an ICBPA intervention in a group of grade three students. A 20% difference in on-task behaviour with children age 10-12 was noted by Riley et al. (2015) between the ICBPA intervention group and control group. Ma et al., (2014) showed a 9% difference in on-task behaviour between the control and intervention group with children in grades three and four. Results from the current study showed that the participants improved their on-task behaviour score by nearly 14% after ICBPA, situating the findings within the range seen in previous research.

The mechanisms of how physical activity influences on-task behaviour are important to consider. The ability to stay on-task is related to executive functioning. Executive functions consist of switching attention to different stimuli, allocating attention selectively, inhibiting actions, and updating memory (Smith & Jonides, 1999). Executive

functioning plays an essential role in learning and there is a growing body of evidence indicating that physical activity causes neurobiological changes that benefit executive functioning (Barenberg, Berse, & Dutke, 2011). For example, physical activity induces structural changes in the brain via neuroplasticity (Ratey, 2010; Tomporowski et al., 2011). Neurogenesis, the growth of new brain cells and foundation of learning, is an important product of neuroplasticity (Ratey, 2010).

In order to further support and develop academic success in Indigenous children, research needs to shift to assessing the effectiveness of strategies to improve Indigenous children's learning (Canadian Council on Learning, 2009; Rasmussen et al., 2004). This study reveals information on an instructional strategy that may assist Indigenous children in attaining academic success. A body of literature exists on learning styles and instructional methods for Indigenous children; however, the large majority of this literature is not based on empirical evidence (Congress of Aboriginal Peoples, 2010; Rasmussen et al., 2004). The foundation of upgrading teaching and learning cannot be based on beliefs or intuition, but should be built upon rigorous research and evidence (Pashler, McDaniel, Rohrer, & Bjork, 2008). A strength of this study was that it examined an instructional method through rigorous research.

Another strength of this study was that it assessed an instructional method to improve the on-task behaviour of Indigenous children instead of only examining cognitive abilities or standardized tests of intelligence as the outcome. Measuring a child's intelligence does not help improve that child's academic success. Moreover, standardized measures of intelligence that draw out information that has been delivered to the masses in a standardized format are Eurocentric in origin (Battiste, 2002). What Eurocentric methods of assessment lack is a life-long learning approach; teaching and assessing a child's ability to learn in diverse contexts and apply knowledge to unfamiliar situations (Battiste, 2002). On-task behaviour was discussed at length with the school, and it was felt that it was excellent dependent variable because of its universal applicability to learning. Whether young people are learning technology, math, or cultural teachings, they need to be on-task so that learning can occur (Greenwood et al., 2002;

McClelland & Cameron, 2011; Rink, 2001).

One limitation of this study was the significant difference ($p < .001$) between the beginning of lesson scores in the non-active lesson phase and the active lesson phase. In the non-active lesson phase, the on-task percentage during the first 15 minutes of class was 78.7% and in the active lesson the average was 65.1% for the first 15 minutes of class. The participants were more on-task at the beginning of the lesson in the non-active lesson phase and it could be argued that because of this they were more likely to decline in their ability to stay on-task. Likewise, in the active lesson intervention phase the students started the lessons less on-task and subsequently were more likely to improve their on-task ability. These findings indicate that there may be a regression towards the mean issue and thus the intervention may not have been the reason the participants increased their ability to stay on-task during the active lesson phase. The reason for this difference in beginning of lesson scores is unknown. Research notes were reviewed for differences in school or community activities that could possibly influence the difference in scores but no variables that might be responsible for the difference were found. Although this is a limitation, it should be noted that the participants in both of these phases were in the third quartile of on-task ability (between 50-75% on-task). A greater concern would be warranted if, for example, the beginning of lesson percentage in the non-active phase was in the first or second quartile, or if the beginning of lesson percentage in the active lesson phase was in the fourth quartile.

A second limitation of this study was the low levels of compliance for wearing the accelerometers, which resulted in an inadequate amount of data to analyze differences in physical activity between the non-active lesson phase and the active lesson phase. It would be negligent to not describe the design issue associated with this limitation. The non-active lesson phase was five days long. A five-day phase only allows for one non-valid wear day among participants in order to meet the valid wear day requirements. This issue coupled with the problematic circumstance of participants repeatedly coming late to school or leaving early further exacerbated the difficulty in attaining valid measures. If students came late, the teacher would already be teaching and forget to get that student to

put on his/her accelerometer, likewise, if a student left early the teacher would not get the opportunity to retrieve the accelerometer from the student before they left. This situation would sometimes result in the accelerometer being accidentally left at home the following day or days.

Due to a lack of accelerometer data, important information on the frequency, intensity, and duration of physical activity was not gathered. If one of the advantages for ICBPA includes increased physical activity, it is critical to provide evidence that it does indeed increase physical activity. Although this study cannot provide this type of evidence, many other studies with similar interventions have shown increased physical activity. In a review by Norris et al., (2015), six of seven studies examining ICBPA found that physical activity significantly increased during ICBPA interventions. Of the four studies that used accelerometers to assess physical activity, two showed significant increases in moderate to vigorous physical activity (Norris et al., 2015). Future research should continue to assess physical activity; specifically, intensity of activity, associated with ICBPA if a clear understanding of dose response is to be advanced.

2.5 Conclusion

This study extends the evidence available that demonstrates that ICBPA can promote on-task behaviour. ICBPA has the potential to fill two needs with one action. It can increase physical activity and increase conditions for academic success. Additionally, ICBPA can be done in almost any classroom and does not require equipment, gym scheduling, or specific clothing. These benefits, coupled with numerous studies illustrating that teachers positively perceive ICBPA (Goh et al., 2013; Howie & Pate, 2012; Parks, Solmon, & Lee, 2007; Riley et al., 2016), indicate that ICBPA is a suitable instructional strategy for elementary school children.

A distinct feature of this project was that it was done in collaboration with an Indigenous community and with Indigenous educators through a participatory action research framework. Classroom-based physical activity interventions should be developed in consultation with educators, because educators know their classroom and their students best (Norris et al., 2015; Rasberry et al., 2011; Riley et al., 2016). This is

even truer in an Indigenous setting. For over 100 years parents and educators within Indigenous communities had no say in the education of their children. To begin to reconcile it is imperative that Indigenous communities are enabled to participate in the development of education strategies for their children (The Truth and Reconciliation Commission of Canada, 2015). An important facet of reconciliation is the coming together of Indigenous Peoples and non-Indigenous Peoples in a mutually respectful fashion to address Canadian issues, such as Indigenous education (The Truth and Reconciliation Commission of Canada, 2015). When non-Indigenous and Indigenous researchers and educators who know their community intimately work together, interventions can be designed that are tailored for success. Given the challenges that some on-reserve schools face in regard to funding for physical activity equipment, programming in-class physical activity can be a strategy to offer more physical activity. Moreover, the benefit of increased on-task behaviour may assist some Indigenous children in achieving greater academic success.

2.6 Bridge to Study Two

In study one, the participants were children in grades four and five. Findings from study one showed that on-task behaviour increased after the use of ICBPA. Results also revealed that in the non-active lesson phase on-task behaviour decreased from the beginning of a 45-minute class to the end of that class. These findings are important as they bolster the body of evidence that already exists on the impact of ICBPA on on-task behaviour with participants from grades three through five (Carlson et al., 2015; Grieco, Jowers, & Bartholomew, 2009; Ma, Le Mare, & Gurd, 2014; Mahar et al., 2006). Another important feature of study 1 was that it was the first study to examine the relationship between ICBPA and on-task behaviour with Indigenous children.

Study 2 examined on-task behaviour with Indigenous children in kindergarten and grade one, which expands available research with on-task behaviour by branching out into early elementary school research. There have been limited studies with on-task behaviour and ICBPA with this important age group. The first years of elementary school are a time of change for children as they transition from learning at home or in a pre-

school/daycare setting to an elementary school environment (Rimm-Kaufman, Pianta, & Cox, 2000). Kindergarten and grade one students are also in their final years of what is termed early years development (Carson et al., 2015). The early years are the most critical and intensive for brain development (Carson et al., 2015). During the early years children acquire increased ability to regulate their attention as part of executive functioning (Carson et al., 2015). Given that this is a time that children rapidly develop the ability regulate their attention, but still cannot regulate attention as well as older children, their response to physical activity in regards to on-task behaviour may be different than what has been shown in studies with older children. To our knowledge there have been no published studies that have examined kindergarten children and ICBPA, and only one study that involved grade one students as part of a larger school-based ICBPA intervention (Carlson et al., 2015). Moreover, there have been no studies examining kindergarten and grade one Indigenous students in respect to on-task behaviour or ICBPA. Therefore, the purpose of study 2 was to examine the effect of ICBPA on on-task behaviour with Indigenous children in kindergarten and grade one.

Chapter 3: Study Two

Kerpan, S, Humbert, L, Rodgers, C. (Submitted for publication). Improving On-Task Behaviour in Kindergarten and Grade One Indigenous Students with the use of Integrated Classroom-Based Physical Activity. *Journal of Early Childhood Research*.

Co-authorship: This manuscript was developed in collaboration with the committee members Louise Humbert and Carol Rodgers. Serene Kerpan had the primary role in the data collection, analysis, and writing of this manuscript. Drs. Humbert and Rodgers provided guidance, suggestions, and editorial input into the creation of this manuscript. This manuscript is presented in the submitted form with the exception of some changes necessary for the conversion to graduate dissertation format.

3.1 Introduction

The first years of elementary school are a time of change for children. It is often a time when new behavioural expectations are introduced. As children leave pre-school or the home environment, the goals, demands, and types of evaluations placed upon them change (Rimm-Kaufman, Pianta, & Cox, 2000). In these first years of elementary school children may be asked for the first time to focus attention, complete tasks, and self-regulate within a structured group setting for long periods of time (Becker, McClelland, Loprinzi, & Trost, 2014; Rimm-Kaufman et al., 2000). These behaviours represent a child's ability to stay on-task. On-task behaviour at school can be described as "behaviour that follows the class rules and is appropriate to the learning situation" (Mahar et al., 2006) and "actively or passively attending to the assigned work" (Shapiro, 2011). Helping children in their first years of elementary school to perform on-task behaviour lays the foundation for its continuation throughout their school years.

The ability to stay on-task is crucial for early success in school. If students are disruptive or not engaged, they may be unable to take part in learning opportunities (Greenwood, Horton, & Utley, 2002). Moreover, there is a clear relationship between the percentage of time a child is engaged on-task and his/her overall academic achievement

(Greenwood et al., 2002). Research on self-regulation, a component of on-task behaviour, demonstrates that self-regulation provides a foundation for academic achievement from pre-school through adulthood (McClelland & Cameron, 2011). It is evident that on-task behaviour is important for young learners; unfortunately, many children entering elementary school struggle to stay on-task, and this negatively affects their integration to school. Research conducted with a large national sample of kindergarten teachers has shown that nearly half of the children in their classes have difficulty adjusting to school (Rimm-Kaufman et al., 2002). This difficulty lies in their ability to stay on-task, follow directions, and work independently, not in their academic competence (Rimm-Kaufman et al., 2002).

One strategy to help children adjust to elementary school and adhere to the expected behaviour of staying on-task is to increase opportunities for them to be physically active during class time. Research over the past decade has shown that physical activity improves children's academic achievement and learning abilities (Erwin et al., 2012; Tomporowski et al., 2011). More specifically, a select number of studies have shown that physical activity improves on-task behaviour for elementary school children in grades three through five (Carlson et al., 2015; Castelli et al., 2014; Grieco et al., 2009; Ma et al., 2014; Mahar et al., 2006; Riley et al., 2015). One study has examined the effect of physical activity with on-task behaviour for children in grade one through six and found a positive relationship between on-task behaviour and physical activity; however, the findings were aggregated, thus there was no available data on just the grade one participants (Carlson et al., 2015). There have been two studies with pre-school participants that have examined physical activity and outcomes related to on-task behaviour. These two studies found that sustained attention and self-regulation improved with physical activity in pre-school children (Becker et al., 2014; Palmer et al., 2013). However, to our knowledge, there has been no published work examining how physical activity specifically affects the on-task behaviour of kindergarten or grade one children.

Integrating physical activity into the classroom for kindergarten and grade one children is important not only to improve their learning abilities but also to improve their

health. Kindergarten students experience changes in their daily schedules and activities once they enter school, and this negatively impacts their physical activity levels. The Canadian Community Health Measures Study results indicate that 84% of pre-school children are attaining the recommended amount of daily physical activity, but at age five the percentage of children acquiring the daily-recommended physical activity drops to 14% (Colley et al., 2013). This finding is troubling given that children acquire numerous health benefits from physical activity. Children who are active develop healthy bones and muscles, have a reduced risk of developing chronic diseases, and they have enhanced mental health (Janssen & Leblanc, 2010). Thus, increasing physical activity may serve dual purposes by improving learning abilities and aiding children in meeting the recommended amount of daily physical activity.

Making time in the school day to increase physical activity presents challenges to kindergarten and grade one teachers. There are heightened academic goals today for young children, resulting in increased pressure on teachers to spend more time focusing on meeting standardized outcomes in areas such as mathematics and literacy (Becker et al., 2014; Vazou et al., 2012). In kindergarten, students also come to the classroom from diverse backgrounds and with a wide range of learning abilities (Rimm-Kaufman et al., 2000). For example, some may have emerging or strong reading skills while others may not be able to identify any letters yet. These differences in skills make the task of ensuring all students achieve the expected outcomes even more challenging. This, when coupled with a lack of full understanding of the benefits of physical activity for learning, often results in a decrease or removal of physical activity opportunities to secure more time to focus on academic goals (Erwin et al., 2012).

One potential way to increase daily physical activity for young children in school and still maintain curricular time is to provide opportunities to be active by creating an integrated classroom that incorporates academic content into physical activity (Donnelly & Lambourne, 2011). Integrated classroom-based physical activity (ICBPA) involves providing opportunities for students to get up and out of their desks, move around the classroom, and play games that not only get the students active but also reinforce what is

being taught in the curriculum. Multiple positive outcomes can occur from ICBPA, including an increase in daily physical activity, reinforcement of academic content, and improved learning outcomes, all while preserving time allotted to academic instruction (Bartholomew & Jowers, 2011). ICBPA has been used successfully in studies examining how physical activity affects on-task behaviour in grades two through six (Carlson et al., 2015; Grieco et al., 2009; Ma et al., 2014; Mahar et al., 2006; Riley et al., 2015). There has been one study examining a similar type of ICBPA with pre-school children; results from this study found that the pre-school children who experienced ICBPA had better early literacy skills (Kirk, Vizcarra, Looney, & Kirk, 2014). Although research is emerging on ICBPA with both pre-school children and older elementary school children, there is no published research that examines if such a strategy is successful with children in kindergarten and grade one. Therefore, the purpose of this study was to examine the effect of ICBPA on the on-task behaviours of kindergarten and grade one students.

3.2 Method

3.2.1 Participants

For this study, we collaborated with a First Nations elementary school in a First Nations community close to a Canadian prairie city. The nine participants ($n=9$) in this study were in a kindergarten and grade one combined class. The power calculation used to establish sample size was done with G Power 3.1 (Faul et al., 2009). An effect size of 0.6 was used based on previous research (Mahar, 2006). Using α of 0.05 at 80% power, it was predicted that six participants were needed for this study. The repeated measures design (discussed in succeeding section) used in this study had a within-subjects factor with four levels. This design increases the statistical power for detecting change in a smaller sample size because it allows for the assessment of within changes over time through multiple measures (Guo et al., 2013). It should be noted that the entire class ($N = 16$) took part in the intervention activities because the teacher designated them as a teaching method and curricular implementation. The nine participants and their parents or guardians who gave informed consent and assent took part in the measurement

component (64% participation rate). Ethical approval for this study was acquired from the researcher's university ethics board and from the participating school's First Nation Council.

The teacher of the grade one and kindergarten class was a First Nations woman who was early in her teaching career. During research planning meetings, she expressed that she would feel more comfortable if the researcher would lead the ICBPA intervention activities during class time so that she could watch and learn how to run them herself. After the intervention was complete, the teacher explained that she did feel comfortable using ICBPA after watching the researcher lead the class through the activities.

In Canada, Indigenous Peoples experience a disproportionate level of low academic achievement. The national rate of high school non-completion for on-reserve Indigenous Peoples is 61% (Congress of Aboriginal Peoples, 2010). Provincial data shows that by grade four Indigenous students in Saskatchewan rank 20% lower in reading proficiency than non-Indigenous students (Steeves, Carr-Stewart, & Marshall, 2010). The need to close the educational achievement gap is great given the growth of this population. Between 1996 and 2006 the Indigenous population grew at a much faster rate than the non-Indigenous population at 45% and 8%, respectively (Statistics Canada, 2013). In Saskatchewan, where the Indigenous population is among the largest in the country, nearly half of children entering kindergarten in 2016 will be Indigenous (Saskatchewan School Board Association, 2015).

There is a widespread call to enhance the academic success of all Indigenous students; however, recently some have stated that there needs to be a focus on young children because of how critical it is for children to develop learning skills at an early age (Niles, Byers, & Krueger, 2007; Preston, Cottrell, Pelletier, & Pearce, 2012; White & Peters, 2013). Early learning experiences for Indigenous children hold educational, social, health, and economic potential (Preston et al., 2012). The delivery of quality early childhood education is a crucial tool in achieving parity between Indigenous and non-Indigenous learners (Niles et al., 2007).

3.2.2 Participatory Action Research

School leaders, teachers, and researchers worked together to develop and conduct this study. From the earliest stage of deciding what outcome to measure, what grades should be involved, and what intervention should be utilized, to the final stages of deciding how to disseminate findings, a team approach to decision making was used. This approach was based on a participatory action research model that promoted shared power, community partner engagement, and research for change (Baum et al., 2006; Israel et al., 2005). This participatory action research model was also appropriate because this study was done in conjunction with an Indigenous community. When researching with Indigenous Peoples, an approach that promotes collaboration, long-term engagement, and mutual benefits can aid in the development of research that is ethical and culturally appropriate (Canadian Institutes of Health Research et al., 2014).

3.2.3 Design

This study used a two-way, [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures design. For one-week, usual practice data were collected. This was called the non-active lesson phase (NALP) because the students received no additional physical activity during class time. During this week, the kindergarten/grade one teacher taught her class as usual throughout the day so that data could be collected on how on-task the participants were under regular circumstances. On-task data were collected in a mid-morning and mid-afternoon lesson. Both lessons were 45 minutes in length. During these non-active lessons the on-task data were collected at the beginning of the lesson and at the end of the lesson so that a pattern in the ability to stay on-task throughout a lesson could be assessed.

After the NALP of a week there was a two-week “active lesson” phase (ALP). The active lessons were taught at the same time of day, covered the same academic subject, and were the same length in time as the non-active lessons, but in the middle of the lesson (approximately 25 minutes after the start of the class) the students got to participate in a five-minute physical activity game that incorporated curricular content relevant to that

lesson. During these active lessons, the same measurements of on-task ability were taken as in the non-active lesson to determine how the ICBPA affected the participants' abilities to stay on-task. All lessons were taught at the same time of day, covered the same academic subject, and were the same length in time in both the pre and post phases.

3.2.4 Intervention

The ICBPA lessons were adapted from the Energizers activities developed by the Activity Promotion Laboratory in the Department of Exercise and Sport Science at East Carolina University (Mahar et al., 2010). The Energizers team developed a series of in-class physical activities for grades 3-5 and K-2 that integrate academic concepts. Previous research has shown that Energizers are effective at improving the on-task ability of children in grades four and five (Mahar et al., 2006). These activities are available at <http://www.ecu.edu/cs-hhp/exss/apl-projects.cfm>. A full description of all of the activities used in this study can be found in Appendix L.

To select which Energizers were going to be used, the teacher and researcher would meet in the morning and pick out the Energizer activities for that day. This action ensured the content of the Energizers reflected content taught in the lessons. In some cases, the content in the Energizer had to be adapted to match the curricular content being taught, these adaptations are available in Appendix L. An example of an Energizer used in the intervention is a game called *Pass it On*. In *Pass it On*, there are four cards of different colors. The person leading the activity explains to the students that each color corresponds to an activity; such as green means swim, or yellow means twist. The students all get a card and get to do that activity for 15 seconds, and then the leader says "pass it on" and they pass their card to another student. They then have to determine the color of the card and recall what activity they are supposed to do with the card, and then students perform that activity for another 15 seconds. The game continues for five minutes. During the game the leader can switch up the activities to keep the children engaged. For example, if green meant swim, the teacher could then tell the class that

green meant hop. Figure 3.1 is a photograph of the participants playing *It's a Zoo in Here*. Figure 3.1 is a photograph of the participants listening to instructions on how to play *Pass It On*.

Figure 3.1 Kindergarten and grade one participants playing *It's a Zoo in Here*



Figure 3.2 Kindergarten and grade one participants learning *Pass it On*



3.2.5 Defining and Measuring On-Task Behaviour

A research assistant and I assessed on-task behaviour through direct observation. Due to the challenging nature of measuring on-task behaviour, Mahar (2011) established guidelines for collecting credible on-task data that include: (a) accurately define the behaviour so it can be measured reliably, (b) train observers to be objective and nonjudgmental, (c) ensure inter-observer reliability prior to field research, and (d) ensure inter-observer reliability in the research data. Through memorization of behaviours and piloting, these guidelines were followed for this study. Similar definitions to those used in previous research were used for on and off-task behaviour (Grieco et al., 2009; Mahar et al., 2006; Shapiro, 2011). The six categories used were: on-task motor, on-task verbal, on-task passive, off-task motor, off-task verbal, and off-task passive. These six coding categories had operationalized definitions and a list of examples of behaviours that would fit into the categories (Table 3.1).

Table 3.1

<i>Definitions and Examples of On- and Off-Task Behaviours</i>		
Behaviour	Definition	Examples
On-task Verbal	Any time the student is verbally engaged in the topic being taught.	Asking questions related to their work, talking to others about the work, answering questions when requested to do so.
On-Task Motor	Any time the student is actively attending to the assigned task.	Writing, raising a hand, and leaving their desk for a reason applicable to the assigned task.
On-Task Passive	Any time the student is passively attending to the assigned task.	Listening to the teacher, looking at their work, listening to a peer talk about the assigned task.
Off-task Verbal	Any audible verbalizations that are not permitted or not related to the assigned task.	Talking to others about unrelated topics, making unauthorized comments, or noises.
Off-Task Motor	Any instance of motor activity that is not directly associated with the assigned academic task.	Reading or writing inappropriate or unassigned material, leaving the desk without receiving permission, physically touching other students.
Off-Task Passive	Any time a student is passively not attending to assigned academic task.	Gazing off, placing his head on the desk, looking at other students when not part of a given task.

Researchers measured on-task behaviour for 15 minutes at the beginning of class (pre-lesson) and then again for 15 minutes at the end of class (post-lesson). Fifteen minutes was selected because of the way in which the class was organized and because a similar previous study has used a 15-minute measurement time (Grieco et al., 2009). During observations, momentary time sampling was used to collect the on-task data. During momentary time sampling, observers recorded what happened at a predetermined moment (Hintze et al., 2002). Momentary time sampling gives an accurate estimate of percentage time when brief intervals of less than 30 seconds are used (Saudargas & Zanolli, 1990). During piloting, the observers tested both 5-second and 10-second intervals. Ten second intervals were chosen because it gave the observers enough time after recording the observation to visually locate the next participant. Each observer wore a wireless headset that transmitted a beep every ten seconds. At the moment the beep occurred the behaviour of the participant was recorded, and then the observer would visually locate the next participant on the list and wait for the next beep. Once all nine participants were recorded, the observers would start again and record all the participants again and continue this pattern until the 15 minutes were up. This resulted in approximately 10 observations per participant per lesson and 10 observations per participant post lesson.

On-task data was analyzed with SPSS 2.0. Mean on-task behaviour was calculated as a percentage of time on-task for each participant at the beginning and end of each active and non-active lesson. For example, if a participant had ten momentary time samples of on-task behaviour done in one of the observation periods, and six of the observations resulted in them being on-task then they would be recorded as 60% on task for that period. Mean on-task behaviour was then calculated for the entire class at all four time points (beginning of lesson non-active phase, end of lesson non-active phase, beginning of lesson active phase, end of lesson non-active phase). Group series means were used to replace missing data from participant absentees (Tabachnick & Fidell, 2013). All data was checked for normality and significance was set at $p < 0.05$. A two-

way, [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures ANOVA was conducted to determine if the beginning of lesson and end of lesson on-task data were different in response to whether the data was from the non-active lesson phase or active-lesson phase. Following a significant interaction, paired t-tests were used to assess differences between the four factor levels.

3.2.6 Inter-rater Reliability

Prior to the study commencing, a research assistant and I trained to conduct the on-task measurement. We reviewed and memorized the data collection protocol and the operational definitions for each observational category (on-task motor, on-task verbal, on-task passive, off-task motor, off-task verbal, and off-task passive). Observer training occurred in another elementary school with kindergarten and grade one students. The inter-rater reliability for the observers during training was found to be Kappa = 0.615 ($p < .001$), 95% CI (0.788, 0.442). This indicates there was substantial agreement between the observers. During data collection for the actual study, the research assistant (second observer) was present for 50% of the observation days. The inter-rater reliability for the actual study observations was found to be Kappa = 0.741 ($p < .001$), 95% CI (0.780, 0.702). Again, this indicates substantial agreement.

3.3 Results

A two way, [time (beginning of lesson vs end of lesson) x phase (active lesson vs non-active lesson)] repeated measures ANOVA was conducted to determine if the classroom-based physical activity intervention was successful in improving on-task behaviour for participants. The analysis revealed a significant time x phase interaction [$F(1, 8) = 36.77, p < .001$] (Figure 3.1). The partial eta-squared was $\eta^2 = .82$, indicating a large effect.

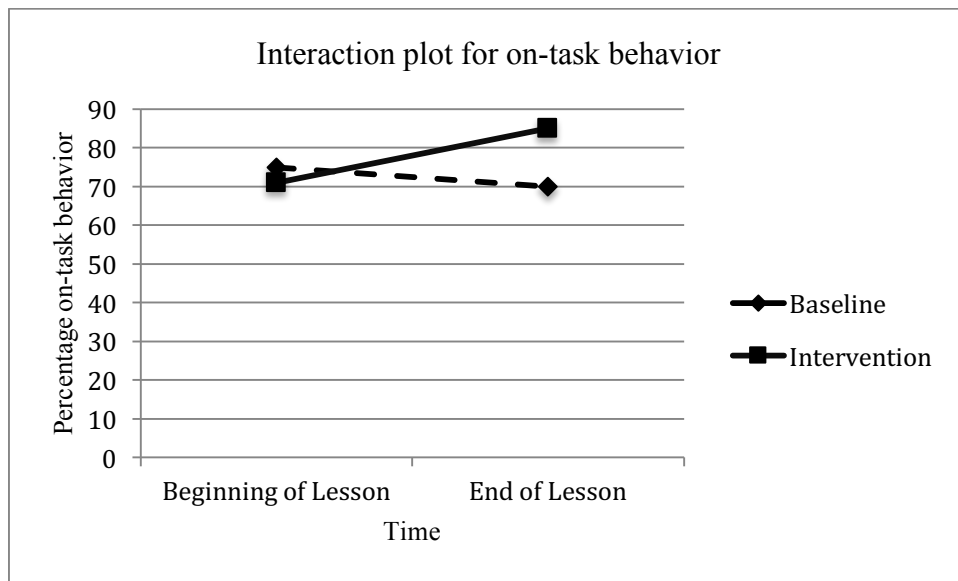


Figure 3.3. Interaction between phase and time predicting on-task behaviour for children in kindergarten and grade one.

In the NALP, when the participants received no physical activity intervention there was a significant difference ($p < .05$) in on-task behaviour scores from the beginning of the lesson to the end of the lesson ($75\% \pm 11.9$ to $69.6\% \pm 8.2$). During the ALP when the students received the ICBPA intervention, there was a significant difference ($p < .001$) in on-task behaviour scores from the beginning of the lesson to the end of the lesson ($70.6\% \pm 8.8$ to $85.3\% \pm 10.2$). When comparing the participants' on-task scores at the end of the class in the NALP to their scores at the end of the ALP the students were 15.7% more off-task at the end of class without the physical activity intervention than in the class with the intervention ($p < .05$). The individual on-task behaviour scores for all participants are available in Appendix E. Although there was a difference in pre-observation scores in the NALP and ALP, they were not statistically different ($p > .05$). Mean on-task behaviour percentages are shown in table 3.1.

Table 3.2

Mean Percentages of On-Task Behaviour

Percentage of on-task behaviour	Non-active lessons		Active lessons	
	Beginning of lesson	End of lesson	Beginning of lesson	End of lesson
Mean	75	69.6*	70.6	85.3**
SD	11.9	8.2	8.8	10.2
Minimum	48.6	54.3	57.8	62.8
Maximum	87.1	77.1	85.4	95.4

*Differences in on-task behaviour were statistically significant, $p < 0.05$

**Differences in on-task behaviour were statistically significant, $p < 0.01$

3.4 Discussion

This study demonstrates ICBPA can enhance on-task behaviour for children in kindergarten and grade one children. The results from this study are consistent with previous research that revealed on-task behaviour improves with increased physical activity and, subsequently, decreases with the absence of physical activity (Grieco et al., 2009; Ma et al., 2014; Mahar, 2006). Additionally, these findings further support the link between movement and cognition for young children. Emerging research demonstrates that physical activity has a positive effect on cognitive development in early childhood (Carson et al., 2015). This stage of life is one of the most important periods for brain development and physical activity can aid in facilitating optimal development, which later translates in academic accomplishments (Carson et al., 2015).

Our findings revealed that when the children did not receive a physical activity break in a 45-minute lesson their ability to stay on-task dropped significantly. This finding is supported by several studies that illustrate that when students do not get recess they are less able to stay on-task and are far more fidgety (Barros, Silver, & Stein, 2009). Results from the present study also revealed that when students did get a short physical activity break in the middle of a lesson their ability to stay on-task increased from the

beginning of the lesson to the end. These findings are consistent with the findings from Becker et al., (2014) who found that children in their pre-kindergarten year of preschool who participated in active play during recess were significantly better at self-regulation than those who did not get to participate in active play at recess.

Previous on-task behaviour and physical activity research with similar designs and methods indicated that physical activity breaks done in the classroom increased the participants' ability to stay on-task by 8% with grade three and four children (Mahar et al., 2006), 2% with grade three children (Grieco et al., 2009), and 7% with grade two and three children (Ma et al., 2014). The 15% increase in on-task behaviour seen in this study is double that seen in previous studies discussed in the literature with older elementary students. More research is needed; however, this finding could indicate that kindergarten and grade one children may benefit from increased opportunities to be physically active in the classroom even more than older children, and this could help to improve their ability to adhere to the behaviours expected of them in the classroom.

This study further illustrates that a short physical activity intervention can help students be more on-task in school and this may assist in their success as students. Unfortunately, opportunities to be physically active are often the first thing cut when there is a need to improve academic outcomes; more time during the school day is then dedicated to sedentary academic instruction and less to physical activity (Vazou et al., 2012). When they know that physical activity is important for children, teachers are generally supportive of it, however they find it challenging to offer physical activity opportunities due to pressure to use their time for academic instruction (Ward et al., 2006). The ICBPA used in this intervention mitigates this issue because it integrates academic content in the physical activity break.

It is important to also consider the health benefits of increasing daily physical activity for young children (Janssen & Leblanc, 2010). The school is an ideal place for children to gain these health benefits because they spend a large part of their day there. However, this potential is often not realized due to time constraints in the school day and the low priority that some teachers and administrators place on physical activity

(Donnelly & Lambourne, 2011). It has been argued that schools actually promote a sedentary lifestyle because students spend between six and eight hours in sedentary academic instruction per day (Donnelly & Lambourne, 2011). Although physical education class plays a role in combatting these sedentary effects, the reality is that often children spend less than half of the physical education class time in moderate to vigorous physical activity (Levin et al., 2001). Classroom physical activity can add to physical activity accumulated during the school day (Carlson et al., 2015).

A limitation of this study is the lack of physical activity data to accompany the on-task behavioural data. Determining how much physical activity is accrued during ICBPA is important as it helps to build a body of evidence around dose response. Knowing the frequency, intensity, and duration of physical activity associated with ICBPA is key in the promotion of this valuable instructional method. For this study, accelerometers were used; however, there was a low level of compliance for wearing the device and consequently there was not enough valid wear days based upon established valid wear day values for children (Esliger et al., 2005; Evenson et al., 2008; Evenson & Terry, 2009; Rowlands, 2007). Future research on ICBPA with early-years children should assess physical activity and institute methods for increased accelerometer wearing compliance.

This study investigated a teaching method that can aid young Indigenous children on the journey to academic success. The provision of quality education for early-years children is important for all children, but especially for Indigenous children due to issues of inequality and disadvantage (Preston et al., 2012). These inequities are caused by generations of Indigenous children who have experienced colonization and attempts at forced assimilation (The Truth and Reconciliation Commission of Canada, 2015).

Often it is assumed that best practice in early childhood education for non-Indigenous children are the same for Indigenous children, however; this is not the case as there are differences in societal values and behavioural expectations (Niles et al., 2007). This false notion that what is best for non-Indigenous children is best for Indigenous children has been preserved through colonization. Indigenous communities need to be

able to design and implement early childhood education strategies based upon their beliefs, values, and contextual realities (Preston et al., 2012). Indigenous pedagogy, which is based on the beliefs, values, and realities of Indigenous Peoples, often focuses on experiential learning, service learning, and learning that takes place outside of a traditional school (Preston et al., 2012). Students often have more self-determination, even from a younger age, with Indigenous pedagogy (Preston et al., 2012). In sum, Indigenous pedagogy promotes self-reliance, observation, reflection, discovery, respect for nature, and learning through lived experience and narratives (Archibald, 1995).

Because of these distinct differences in pedagogy it is important to work with Indigenous communities when designing and implementing research focused on the education of Indigenous children (Preston et al., 2012). A notable aspect of this study is that it was done in partnership with an Indigenous community and Indigenous participants. Through the use of participatory action research, school leaders and teachers collaborated with the researcher to design the study and select an assessment that was meaningful to their community based on values and behaviours important to them. This collaboration was key in this research project. Future researchers interested in enhancing the educational experiences of Indigenous children are encouraged to utilize community engaged research processes.

3.5 Conclusion

The benefits of ICBPA are many. ICBPA can be easier to implement than other types of physical activity because it is done in the classroom and does not require equipment, gym scheduling, or special clothes. Most importantly, ICBPA can improve on-task behaviour and increase daily physical activity levels concurrently. Classroom activities that promote physical activity are easily accessible through the Internet and can be easily adapted to fit most curriculums and classroom needs. Because of the academic benefits of physical activity, teachers should be encouraged and supported by school administrators and leaders to incorporate more physical activity in the day for children in their first years of school.

3.5 Bridge to Study Three

Studies 1 and 2 were interventions that examined the quantitative effect of ICBPA on on-task behaviour for Indigenous children in kindergarten, grade one, grade four, and grade five. Study 3 is a qualitative study that examined the perceptions of the teachers and students who engaged in the ICBPA interventions. The collection of both qualitative and quantitative data for a more complete understanding of my field of research is referred to as a mixed-methods approach (Creswell, 2014).

The primary advantage of mixed-methods research is that it has the benefit of both qualitative and quantitative research. It provides the voices of the participants and provides context while reducing the bias in interpreting results (Creswell, 2014). One disadvantage of quantitative research is that it does not seek to understand or describe the context the research takes place in nor share the voices of the participants, while qualitative research can have limitations such as bias (Creswell, 2014). In this dissertation, there was a need to enhance the quantitative findings with a qualitative study because demonstrating that ICBPA increases on-task behaviour does not explain the subtleties of when it worked well, when it did not work, what the teachers thought about it, and how they felt about continuing to use it in every day practice. Moreover, understanding what the children who participated in the ICBPA intervention believed was important because children's attitudes impact teachers in their choices of classroom activity (McMullen, Kulinna, & Cothran, 2014). Whether students like or dislike an activity influences a teacher's use of the activity (Webster et al, 2015). These questions were best answered through an additional research phase of qualitative research.

Mixed-methods research is a research approach with philosophical assumptions as well as methods of inquiry. As a methodology, mixed-methods permits researchers to use multiple worldviews rather than the typical association of singular worldviews with either qualitative or quantitative methods alone (Creswell, 2014). The two worldviews that frame my work are pragmatist and participatory (Plano Clark & Creswell, 2011). Pragmatism is often concerned with the consequences of research and it is oriented

toward what works in practice, while participatory is oriented toward changing the social world for the better and is often issue oriented, collaborative, and supports empowerment (Plano Clark & Creswell, 2011).

As a method of inquiry, mixed methods focuses on collecting and analyzing both qualitative and quantitative research in a single study or a series of studies (Plano Clark & Creswell, 2011). The research designs can be either fixed or emergent depending on the individual details of the studies and their contexts (Plano Clark & Creswell, 2011). For this research, the design was fixed as the three studies were designed in collaboration with Whitecap Elementary School before data collection started. The primary design model for this research was an explanatory sequential mixed-methods model (Creswell, 2014). In this approach, the researcher first conducts quantitative research and then builds on those results and explains them in more detail with follow-up qualitative research (Creswell, 2014). The qualitative and quantitative data are analyzed separately and reported separately at first but then later brought together to show how the qualitative findings help explain the quantitative research (Plano Clark & Creswell, 2011). As follows, the third and final study of this dissertation is a qualitative study that helps bring context to the quantitative interventions and shares the voices of the participants in a way that helps explain the quantitative findings.

Chapter 4: Study Three

Kerpan, S, Humbert, L, Rodgers, C., Abonyi, S. (Unpublished). The Perceptions of Indigenous Teachers and Students on Integrated Classroom-Based Physical Activity.

Co-authorship: This manuscript was developed in collaboration with the committee members Louise Humbert, Carol Rodgers, and Sylvia Abonyi. Serene Kerpan had the primary role in the data collection, analysis, and writing of this manuscript. Drs. Humbert, Rodgers, and Abonyi provided guidance, suggestions, and editorial input into the creation of this manuscript. This manuscript is currently being developed for publication. It is presented in a format acceptable for the requirements of a graduate dissertation.

4.1 Introduction

Integrated Classroom-Based Physical Activity (ICBPA) is short-bout physical activity done in school classrooms that integrates academic content and movement. Examples of ICBPA include Energizers (Mahar et al., 2006), Take 10! (Stewart, Dennison et al., 2004), Texas I-CAN (Grieco et al., 2009), and Move-to-Improve (Dunn, Venturanza, Walsh, & Nonas, 2012). When children take part in ICBPA, they are physically active for one to ten minutes at varying degrees of intensity in their classroom during class time. (Bartholomew & Jowers, 2011; Donnelly & Lambourne, 2011; Grieco et al., 2009; Mahar et al., 2006). While participating in these physical activity opportunities, the teacher integrates curricular material into the movement so that the students are learning while exercising (Bartholomew & Jowers, 2011; Donnelly & Lambourne, 2011; Grieco et al., 2009; Mahar, 2011). The intention of ICBPA is not to replace physical education, but to supplement it (Webster et al., 2015).

A body of compelling evidence is forming around the benefits of ICBPA such as (a) improved academic outcomes, (b) improved on-task behaviour, (c) improved cognitive functioning (d) increased moderate to vigorous physical activity, (e) reduction in sedentary time, and (f) increased student enjoyment and effort (Webster et al., 2015).

Moreover, teachers can continue to teach academic content while students are active, reducing the concern of taking time away from the academic curriculum for physical activity (Donnelly & Lambourne, 2011). This integration of academic content is the key difference between ICBPA and other forms of movement integration in the classroom, which does not link to academic content. ICBPA is now considered a promising strategy by multiple national organizations, and it is often included in comprehensive physical activity school-based interventions (Centers for Disease Control and Prevention, 2013; Institute of Medicine, 2013; Russ et al., 2015).

Increasing physical activity is important for all children. However, there is evidence that more physical activity may be critical for Indigenous children. The Indigenous population in Canada is growing rapidly. Between 2006 and 2011, the population of Indigenous Peoples in Canada increased by 20%, compared to a 5% increase for the non-Indigenous population (Statistics Canada, 2012). Amongst Indigenous youth there are alarmingly high rates of obesity, chronic disease, and mental health issues (Kirmayer, Simpson, Cargo, 2003; Reading, 2009). Increasing opportunities for physical activity during the school day may help children accumulate the minutes required to receive health benefits such as reduced risk of cardiovascular disease, diabetes, certain cancers, depression, and anxiety (Coble & Rhodes, 2009; Janssen & Leblanc, 2010).

In addition to risks to their health, Indigenous youth fall behind in most indicators of academic success (Friesen & Krauth, 2009; Mushquash & Bova, 2007). High school non-completion for on-reserve Indigenous Peoples is approximately 61% in Canada (Statistics Canada, 2013). In the 2008/2010 First Nations Regional Health Survey, data showed that 14% of First Nations children living on reserve aged 6 to 11 years repeated a grade, compared with 3.5% of children in the general Canadian population (First Nations Information Governance Centre, 2012). Aside from this survey, there is very limited national data on the educational outcomes of Indigenous elementary school children (Canadian Council on Learning, 2009), but off reserve provincial and school-level data indicate that a large achievement gap exists between Indigenous children and non-Indigenous children (Friesen & Krauth, 2009; McCarty, 2009; Steeves et al., 2010). A

concerning feature of the low academic attainment situation is the lack of empirical research on what contributes to academic success for Indigenous children (Baydala et al., 2009; Congress of Aboriginal Peoples, 2010).

Due to the lack of empirical evidence on what contributes to academic success for Indigenous children and the emerging research on the benefits of ICBPA, a multi-stage project was designed to assess the effects of ICBPA on the on-task behaviours of Indigenous children and to understand the perceptions of the students and teacher who engaged in the ICBPA intervention. The findings presented in this paper are the result of the final study in the project, which examined the perceptions of students and teachers who engaged in the ICBPA interventions. It is important to understand the perceptions of the educators and students who have experienced ICBPA as it is unlikely that teachers will use ICBPA if they or their students perceive it negatively (Goh et al., 2013; McMullen et al., 2014). Moreover, it is important to understand the barriers and facilitators to implementing ICBPA so that activities can be adapted to help teachers overcome those barriers and utilize available facilitators (Goh et al., 2013).

Examining the perceptions of Indigenous teachers and Indigenous students who take part in such interventions also are consistent with the standards for research with Indigenous Peoples (Canadian Institutes of Health Research et al., 2014). Collaborating with teachers and students to understand their perspective increases the strength of the research relationship. Engaging in meaningful conversations about their experiences shows the participants that their knowledge is relevant and valuable, and this demonstrates respect for the expertise they bring to the research partnership. The need for this research as part of a community engaged research project led to the purpose of this study, which was to understand how the ICBPA interventions were perceived by the teachers and students who were involved in them, through qualitative methods. By gaining insight from the participants we were able gather valuable information on how, when, and why teachers and researchers might utilize ICBPA, and what barriers and facilitators exist to utilizing ICBPA.

4.2 Method

4.2.1 Participants and Study Background

This qualitative study was conducted in collaboration with a First Nations elementary school in a First Nations community located near a mid-sized Canadian prairie city. Ethical approval for this study was received from the researcher's university ethics board and from the participating school's First Nation Council. Two First Nation teachers and one grade four and five combined class took part in this qualitative study. A combined class is a class with one teacher that teaches two grades because of low student numbers in those respective grades.

Both teachers were female, Indigenous, and lived in a nearby city and commuted to the First Nation community to teach. The Kindergarten and grade one teacher had two years teaching experience and the grade four five teacher had taught for seven years. Only the grade four and five combined class took part in the qualitative interviews for this study as the school principal believed interviewing the kindergarten and grade one students would not be appropriate. The grade four and five combined class had 13 students participate (92% participation rate). The mean age of the grade four and five combined class participants was nine and half years old.

The ICBPA program used in the interventions was Energizers, developed by the Activity Promotion Laboratory in the Department of Exercise and Sport Science at East Carolina University (Mahar et al., 2010). Previous research by Mahar et al. (2006) established that Energizers improved on-task behaviour for participants in grades three and four. Energizers are available on the Internet for public use (<http://www.ecu.edu/cs-hhp/exss/apl-projects.cfm>) and are available for grades three through five and kindergarten through grade two. *Air Writing* is an example of one Energizer activity used in this intervention. During *Air Writing*, students hop, march, or jump around the class. When the teacher calls out a letter or shape, the children freeze and air write that shape or letter. Each ICBPA was approximately five minutes in length and was conducted in the classroom. They were done twice a day, once in the morning and once in the afternoon.

4.2.2 Participatory Action Research and Timeline

Participatory action research (PAR) guided this research project. The selection of the methodology, the project design, and methods were informed by an advocacy/participatory and a pragmatic worldview (Creswell, 2007).

Advocacy/Participatory worldview advocates for an action agenda and often includes issues facing marginalized groups (Creswell, 2007). Pragmatism emphasizes a “what works” approach and centers on solutions to problems (Creswell, 2007). Coupling these worldviews led to the selection of PAR methodology because their attributes align well with the objectives of PAR.

PAR is cyclical and is made up of reflection, data collection, and action phases (Baum et al., 2006). The goal of PAR is to embark on a process of positive change through partnership on research that is meaningful to those involved (Macdonald, 2012). Empowerment, capacity building, reciprocity, and shared power and decision-making are central aspects of PAR (Baum et al., 2006). The researcher who led this project began the research process by engaging in a series of meetings with school leaders and teachers at the participating school about physical activity, student needs, behaviour, and learning outcomes. These meetings resulted in the development of a research project that reflected the phase’s aspect of PAR. Two intervention studies were designed to produce action in terms of real changes to the students on-task behavior, and then the qualitative study discussed in this paper represented the reflection component of PAR.

It was decided at the meetings that the kindergarten and grade one combined class and a grade four and five combined class would be ideal classes to work with for this project as they had larger class sizes, they represented different age groups in the elementary school setting, and they had teachers who were interested in participating. On-task behaviour was chosen by teachers and school leaders as the outcome to assess as they felt it was an important learning attribute. The teachers and school leaders felt it was relevant to Indigenous learners because on-task behaviour is the precursor to learning in all situations and contexts. Whether a student is learning math, reading, or their traditional language and culture they need to be on-task to learn (Rink, 2001).

Over the two-month planning period, the intervention phase, and the qualitative phase of this project, the researcher engaged in reciprocity with the school community by regularly volunteering to help at school events such as feasts, recess and lunch supervision, and aided in classroom activities. These actions resulted in the development of positive relationships throughout the school community.

4.2.3 Data Collection

Qualitative methods were used so that the perspectives and experiences of the participants could be described and understood (Creswell, 2003). One-on-one interviews with both teachers and a focus group with the grade four and five combined class participants were conducted with the intent to provide context for the two previous ICBPA interventions. A focus group with the student participants was chosen as discussion among young participants has been shown to provide rich descriptive data (Patton, 2002). One-on-one interviews were conducted with the teachers because it was predicted that the information they may share could be confidential due to discussing individual student participants.

Both the student focus group and the two one-on-one interviews with teachers used a semi-structured interview guide. A semi-structured guide allowed for the systematic collection of data on important topics while allowing the conversations to flow to other topics that were also important, but were not initially identified as important (Morse & Field, 1995). The topics that guided the semi-structured interviews and focus groups are presented in Table 4.1. To help the student participants convey their experiences the questions were framed around asking them what they liked and did not like about certain aspects of the *Energizers*. Prompts were used once the participants started to share answers. Many of the prompts were created as the focus group conversation developed. For example if the students all remembered a particular game or day with detail I focused on asking as much as I could about that topic. Some questions also started out with “If you were in charge” to help the participants understand that their answers were important. Interview questions for both teachers and students can be found in Appendix D.

The interviews and focus groups were audio recorded and data was transcribed verbatim. Interview transcripts and initial results were returned to participants for member checking and review. Students in the participating grade four and five combined class were given a focus group pizza lunch and a day-long class party with crafts and outdoor activities provided by the researcher as a way to thank them for participating in the project. Teachers were given \$100 gift cards for participating in the project.

Table 4.1

Interview Topics

Intervention outcomes (measured and not measured)
Continuation of ICBPA after study completion
Activity preferences
Barriers and facilitators to integrating physical activity in the classroom
Improvements to intervention strategy
Activity preferences
Time of day preference for utilizing ICBPA

4.2.4 Data Analysis

Thematic analysis offered the systematic aspects of content analysis such as seeking out key words. It also supported a deeper analysis by permitting the researcher to locate what the participants were saying in different contexts and allowed for aligning statements with different themes (Joffe & Yardley, 2004). Important topics and quotes were first coded into categories. Then the interviews were read again, and the categories were grouped into larger themes. The themes were based on common threads that extended through all the interview data (Morse & Field, 1995).

The rigor of this study was established using methods that increased the study's trustworthiness (Morse & Field, 1995). Guba's (1981) commonly cited constructs for ensuring trustworthiness include credibility, transferability, dependability, and confirmability. Credibility is often seen as a comparison to internal validity (Shenton, 2004), and is related to the congruence of qualitative findings with the lived world of the consumers of the research (Guba, 1981). In comparison, transferability is likened to external validity and is concerned with the degree to which the results can be applied to

other settings (Shenton, 2004). Dependability is most similar to reliability; however, the main difference is that the goal is not to replicate the study and achieve the same results, as with reliability, but to provide the reader the opportunity to repeat the study with the understanding that the results will be different because the study is done at a different time (Shenton, 2004). Confirmability deals with objectivity and aids in ensuring “the work’s findings are the result of the experiences and ideas of the informants, rather than the characteristics and preferences of the researcher” (Shenton, 2004, p. 72).

Many methods were employed to ensure these aspects of rigor were addressed. The first step in ensuring this study was trustworthy was the adoption of commonly used approaches in this area of research, such as relationship building. When conducting qualitative research with Indigenous Peoples it is essential that there are strong reciprocal relationships in place (Castellano, 2004). These relationships help in part to address the stereotyping and misinterpretation of results, which has historically been an issue in research with Indigenous communities (Canadian Institutes of Health Research et al., 2014; Castellano, 2004). Information should not be gathered in brief encounters with Indigenous Peoples. Attempts to gain an understanding of the perspective and concerns from an objective, short-term, outsider vantage point have produced much of the research that Indigenous Peoples reject as misinterpretations of their reality (Castellano, 2004). To foster the development of relationships at the school I volunteered my time prior to engaging in any research and throughout my time conducting research. Spending my days as a member of the school community provided me with hundreds of moments to share my personality and fostered friendships within the walls of the staff room, kitchen, gymnasium, and classrooms.

A second, and related, approach to trustworthiness is establishing familiarity with the community and culture (Shenton, 2004). During my time volunteering at the school, I developed relationships with the teachers, school staff, students, and community members who volunteered or worked at the school. Another method that supported the trustworthiness of this study, particularly the credibility, was triangulating the data. To triangulate the data I used the one-on-one interview data, the focus group data,

observational data from field notes, and supporting information such as informal conversations to ensure what I was hearing, seeing, and interpreting was aligned with what the participants actually thought. To triangulate the data in this study I first examined both teachers' interview findings concurrently to see what similarities and differences were present. After seeing similarities, I brought in the student focus group findings and looked to see what similarities and differences were present with both teachers' separate findings, and the similar findings shared by both teachers. After seeing patterns and narratives that wove through the teacher's data and the student's data I examined my field notes and considered conversations I had with the teachers and students outside of the interviews and focus group. I found that this supplementary data complemented my findings and did not produce any contradictions in my results.

Other tactics to ensure credible results included (a) having good rapport with the participants; (b) letting participants know regularly that participation was optional; (c) regular encouragement in the interviews and focus group to be frank; (d) letting participants know that my research project would have the same level of success no matter what they told me; (e) using probes to elicit details which made it harder to falsify data (Shenton, 2004). Member checking was another method I used to increase the trustworthiness of this study (Guba, 1981). Both the transcripts and data analysis with themes were returned to the teachers to review and verify. The teachers saw no issue with the transcripts. Once they had reviewed the transcripts we sat down together to go over the themes. Both teachers felt the themes reflected their words and perspectives. With the student participants I member checked verbally by talking to them as a group and telling them how I interpreted their words and then asked if I had understood them correctly. I took the opportunity to ask each participant in the class if what I had just told them represented their thoughts.

Lastly, the way in which this study has been written strengthens its trustworthiness. By writing in thick description I have provided information for the reader to determine whether what was happening in my research setting matches up with settings familiar to them. I have also written about my paradigm assumptions in the preceding section with

the purpose of being upfront about my worldview, as this underpins the research decisions I have made (Shenton, 2004).

4.3 Results

The themes that emerged in this study depicted both positive aspects and challenges of incorporating ICBPA. The first theme, *Filling two needs with one action*, examines the importance placed on increased physical activity and the academic benefits from the teacher's perspective. The second theme, *Chaos is a barrier to classroom activity*, looks at classroom management issues that present a barrier to utilizing ICBPA. The third theme, *Customize classroom activity*, reveals the need to tailor classroom activity to the setting and students. The last theme, *Make it fun*, captures the perspectives of the student participants. This theme reveals the desire for games and competition among the participants, and what they felt were the benefits to ICBPA. The names of all participants discussed in the results have been replaced with pseudonyms.

When these interviews took place, the teachers and students had not yet seen the on-task data from the interventions. The intervention data showed there were significant improvements in on-task behaviour after the ICBPA interventions. The qualitative interviews were conducted shortly after the interventions were complete and the on-task data had not been analyzed yet.

4.3.1 Filling Two Needs with One Action

This theme encompasses the two perceived positive outcomes of ICBPA, increased physical activity and academic benefits. Both teachers valued ICBPA because it allowed them to give their students more opportunities to be physically active throughout the day, and they both believed that the ICBPA helped their students learn in certain situations. Sarah, the kindergarten and grade one combined class teacher believed that young children need physical activity and that ICBPA was an excellent way to provide them more throughout the day.

I don't think it's [school] a very natural setting for children; so as much exploring and playing you can fit in, active, jumping, running whatever you can fit in to make it not sitting all day in a desk that's a good thing.

Sarah further explained, “I thought they [ICBPA] were good to get them up and off of the floor and out of their seats because the little ones they can’t sit very long.” When asked if she would recommend ICBPA to other teachers she stated, “I would definitely recommend being active in the classroom! I mean they are kids, they should be running around and playing all day but we have to have them in school 6 hours a day.”

Regarding whether or not the ICBPA assisted students in becoming more on-task Sarah was skeptical. When asked if ICBPA helped her students become more on-task she stated, “I know sometimes it works and sometimes it doesn't.” Regardless of whether or not the ICBPA helped her students stay on-task, Sarah recognized that they needed breaks from academic content and she liked that they did not require equipment or clean up after. “It was a good way to break up a lesson, without breaking for choosing time or a play time. It's a lot less cleanup. They are active and they sit back down and they are ready to learn.” In Sarah’s classroom, the students regularly got to choose to spend time at different stations such as blocks, reading nook, puzzles, and cars. After the children were done with the stations there was always a lot of cleanup. With the ICBPA the students received a break and engaged in a fun movement-based activity but there was not a lot of time spent tidying up afterwards.

Amanda, the grade four and five combined class teacher also felt that it was crucial for her students to get more physical activity throughout the day. She thought this was one of the biggest benefits of ICBPA.

I like the whole idea of them getting a little bit more exercise in class because for example a few in my class, like Shaun and Gavin, they don't get any exercise anywhere because as soon as they get home they go and play their video games. Right, so whatever they do get in school is all they get.

Amanda also believed that her students felt better when they got more activity during the day. She explained, “There are some that would like to continue them on for the sake of feeling better. So I think that was a good outcome.” When discussing the academic benefits of the ICBPA Amanda, like Sarah, was unsure if the activities helped the students stay on-task. However, she did believe that they helped with her student’s memorization. The students enjoyed an activity that had them engage in physical activity while practicing their spelling words for the week. Amanda explained that “when you did the spelling activities I found it made them memorize the spelling words a lot more and they did very well on their spelling tests.” When Amanda was asked about recommending ICBPA to other teachers she shared “I think all teachers, once they actually see what is going on and what it's all about, would be like ‘hey you know that’s a good idea.’ My kids [her own children who go to another school] would really benefit from that.”

4.3.2 Chaos is a Barrier to Classroom Activity

When discussing barriers to utilizing ICBPA, the sole issue for Sarah and Amanda was the “chaos” it caused in their classrooms. Sarah explained, “there were a few times where it got a little bit chaotic just because there were some that thought this is just time to fool around.” Observational data supported this finding; it was clear that the students in the kindergarten and grade one class were much louder and more rambunctious during ICBPA than the grade four and five students. Lack of safety in the kindergarten and grade one classroom was also discussed as a consequence of the chaos. “You always have to worry about that [safety]. Especially in the classroom, you don't want them doing anything too crazy and then hitting their heads on the desk or chair.” However, there were no injuries when the students were engaging in ICBPA in this study.

When talking with Sarah about what could be done to reduce the chaos she said, “if we had started at the beginning of the year when we were teaching all the [acceptable classroom] behaviours I think it would have gone a lot smoother.” She further explained

that it is important to “lay out the ground rules first so they know it's not just fun activity time but it's actually something that they are expected to do.” The directions for each individual activity were explained before doing them; however, general rules for ICBPA were not developed and taught to the students during the intervention. For example, if the activity was Air Writing they were told that they should do the movement asked of them, such as hop or jump around the classroom, and when they hear a letter or a shape called out they are to freeze and draw it in the air. However, at the beginning of the interventions there were no rules taught to the students that applied to all the activities part of the ICBPA intervention, such as no hitting or no yelling.

After the activities were complete both Sarah and Amanda felt that it was a challenge to get the students settled back down. Sarah explained how it was similar to her experiences with the students when they returned from recess.

I'm kind of torn. I noticed at recess time sometimes they will go and they will run for 15 minutes at recess just playing all those tag games and just running the whole time and they will come in and they will be off the wall, even though they just burnt that energy, it just takes them awhile to come back and focus.

Sarah also described how children responded differently to physical activity in the classroom. “Those activities, I think they are really good for some kids and then other kids I think it just gets them more riled up.” When describing this issue she seemed undecided on whether the chaos created by some of the children after ICBPA was worth the benefit of having her other students more on-task.

Amanda stated that getting the students settled back down after ICBPA was an issue in her class as well. “Having to settle them back down is a challenge” she stated. She further suggested, “I think a lot of the activities would work really well when we'd come right into the class before we start trying to get on-task.” She explained that if they were already up and moving and not on a specific task yet then it was easier to justify using ICBPA. She did not like the idea of getting them up out of their desks when they were

already on-task because it was hard to settle them back down.

4.3.3 Customize Classroom Activity

Both teachers felt that it was important to tailor ICBPA to the needs of their students. This need was very evident in the kindergarten and grade one classroom. Sarah felt that it was important to customize the ICBPA by using activities that incorporated academic content the students already grasped. Some activities resulted in certain students displaying poor behaviour. Sarah explained it likely had to do with whether students understood the directions of the activity and could participate with the knowledge and skills they possessed. If they could not present the skills or knowledge needed to engage in the activity they would become frustrated and act out.

We would get Michael for like 2 minutes of the activity and then he would just kind of go sit in the corner or lay on the floor or something. But when you tell him to go run some laps in the gym and he can do it. But when you get him into that structured setting where you are asking him to jump now, what number is on the card, what does that correspond to, are you doing a sit up or a star jump? I think he struggles with that. But if you just tell him to run, yeah he understands that. ...just moving.

Sarah suggested that for young students it would be helpful to use ICBPA that incorporates curricular content only when the teacher is confident that all of the students grasp the material and it would be a review activity. She felt that if she were trying to teach new material she would not work it into ICBPA and that she would prefer to do classroom physical activity that is not linked to curriculum with the goal being to get them active and on-task.

I think you could find a balance between using it to teach and using it for burning off energy. I guess the purpose of it is to get them active so that they can focus again after so maybe not so much emphasis on curriculum, or make it a review. So instead of teaching something new like long and short vowels, which is way too hard, teach something they already know like their shapes, letter sounds, or something simple they already know. I think I would mix it up so for those who are like Michael, and are having trouble focusing, maybe we start with something that doesn't require any focus, just moving.

When asked how often and for how long she would ideally use ICBPA Sarah explained that it would depend on the day, what she is teaching, and her timetable.

It really depends on what I'm teaching. I might stop and do just a quick one-minute activity and then sit them down to do the discussion questions so that we don't lose them. But if it's at the end of a lesson and we have 10 minutes that we can do an activity break before going on to a different subject I might take advantage of that if we're switching subjects.

Within this theme of customizing classroom activity emerged the idea that ICBPA needs to be enjoyable. The grade four and five teacher Amanda made it clear that if the activities were not perceived as enjoyable by her students they would not take part in them or would complain about them. One of the best ways to do this according to Amanda was to frame the ICBPA as games, not exercise: "Because if you say exercise then they are not going to want to do it; 'play a game' [they say to me]." Amanda then went on to explain, "competition seemed to motivate them more and they liked ICBPA's that had rewards attached to them".

4.3.4 Make it Fun

The voices of the students are also important to include when examining the barriers, facilitators, and other perceptions of those who took part in the ICBPA intervention. Participants in this study took part in one focus group interview. When interviewing the grade four and five participants they all were in agreement that they enjoyed the ICBPA intervention and would like to keep doing the activities. When asked if they liked all the activities they said that they enjoyed the “fun” activities the most. The activities they thought were fun were the ones that were competitive. When the students were asked to talk about what made activities fun Brian said he enjoyed competitive games because “It makes it more challenging”. The students also stated that they liked it when the activities had teams, for example all of the students liked it when the class was divided into two teams or boys versus girls. Sometimes at the end of the week, the researchers would bring in small prizes to reward a team of students who completed or won the most activities during the week. It was apparent that these small rewards made engaging in ICBPA very fun for the students. When Sarah, the shiest student in the class was asked what she liked about ICBPA she smiled and said “the prizes.” The boys in the class who were generally very vocal also echoed this sentiment in the focus group. Observational data confirmed that rewards and competition did motivate the students to engage in the ICBPA.

While it was obvious that the students loved competition and rewards it was clear they did not like the activities that focused on what they perceived was “exercise”. Building on what Amanda explained, the students also described that they did not enjoy some activities “because they were hard”. When asked which activities were too hard Brian explained, “The ones where we had to jump up and down and when we were doing the sun jumps”. Gavin also explained that “the crawling ones” were too hard. The physical activity they were describing was from the activities that were higher intensity and required the students to be active for longer periods of time.

When talking to the participants about the benefits of ICBPA, the students were quick to recognize that more physical activity was good for their bodies. For example,

Tyler exclaimed, “you get strong doing them!” The students liked that the activities they were doing incorporated what they were learning in class. However, when asked about academic benefits stemming from ICBPA the students were unable to give examples of how it benefited them without prompting. When asked if they felt ICBPA helped them remember what they were learning in class some students said “ya”. But when prompted and asked about remembering spelling words when doing the spelling activity, multiple students shouted “yes!” When the researcher inquired about being tired after the ICBPA and if this was a good or a bad thing the majority of the students said it was a “good thing”. Nolan stated, “that [being tired] means you worked out and burned off your energy”. Picking up on this idea, the researcher further prompted about being able to sit and listen after the ICBPA, and multiple students agreed that they felt they were better able to sit and listen to their teacher after the ICBPA. Collectively, the students felt that the ICBPA was beneficial and when asked if they wanted to do more or less of the activities almost the entire class simultaneously said “More!”

4.4 Discussion

Through the use of one-on-one interviews with two teachers and a focus group with a grade four and five combined class valuable information was gathered about the perceptions these participants held on ICBPA. Both teachers in this study valued the health benefits of physical activity for their students. The largest benefit of the ICBPA for them was giving the students more opportunities to be active throughout the school day. This finding is consistent with the results from Cothrane et al. (2010) who also found that teachers who valued physical activity were more likely to integrate physical activity in their classrooms. Both teachers in this study stated that they thought the ICBPA improved the students’ on-task behaviour occasionally. The teachers also believed that the ICBPA assisted some students in becoming more on-task but not others. Similarly, student focus group data indicated that the students felt the ICBPA helped them academically only occasionally.

Contradictory to the teachers’ beliefs about the efficacy of ICBPA, data from the interventions conducted prior to the qualitative interviews showed that all participants

had a positive change in on-task behaviour from before ICBPA to after ICBPA (Appendix E). This discrepancy between the teachers' beliefs and the actual on-task data is intriguing and warrants further investigation in future research. Investigating if this discrepancy is an issue in other studies examining ICBPA, and if so, why teachers' observations do not correspond with actual results may provide insight into teachers' willingness to implement ICBPA. Weeks after the interviews took place the researcher shared the on-task results with the teachers, and both educators were astonished by the findings. The grade four and five teacher explained that she was so blinded by the few minutes of chaos when settling the children down after the ICBPA that she failed to notice how much more on-task they were for the remainder of the class. This may suggest that teachers should be encouraged to observe the effects of ICBPA after the children have settled down into regular classroom instruction, not in the ensuing minutes immediately after the ICBPA. These findings also speak to the need to objectively measure on-task behaviour and not rely on subjective perceptions when making decisions about teaching and learning.

Teachers in this study felt it was challenging to get the students settled after the ICBPA. They explained that this might be a barrier to using ICBPA in the future. This potential barrier to utilizing ICBPA is understandable as threats to classroom management are a primary concern for all teachers (McMullen et al., 2014). This barrier is not unique to this study; other studies looking at barriers to ICBPA also cite uncontrolled classroom behaviour as an issue that impedes teaching (Goh et al., 2013; McMullen et al., 2014). The kindergarten and grade one teacher from this study suggested that there should be simple rules that apply for all ICBPA, and students need to be taught these rules at the beginning of the year. She also suggested that teachers should use ICBPA regularly so the children remember how the activities are done and what is expected of them. Making clear rules and following the rules on a regular basis is an important strategy for reducing the chaos of ICBPA and helping children settle back down for regular classroom instruction.

In addition to developing overarching rules for ICBPA, some classroom teachers

may need to increase their comfort with physical activity in the classroom if ICBPA is going to be used effectively. McMullen and colleagues (2014) suggest that some teachers may need a period of “student movement recalibration” where they adapt to student behaviours in the classroom that previously were not acceptable. If teachers can adapt and become comfortable with more movement in the classroom, they may not perceive ICBPA as a threat to classroom management and be more willing to attempt using ICBPA. In conjunction with assisting current teachers in adapting to ICBPA, pre-service teachers should also learn about ICBPA. Hands-on experience implementing ICBPA while in the university setting through peer to peer teaching and during practicums could greatly aid in teacher comfort with classroom activity and in classroom management during activity (Webster et al., 2015). This increased comfort may result in more pre-service teachers using these activities when they have a classroom of their own.

Teachers in this study stated that it was important to tailor classroom-based physical activity to meet the needs of their students. It was very apparent in the kindergarten and grade one class that the students were all very unique in their abilities, personalities, and dispositions. The kindergarten and grade one teacher in this study discussed choosing only movement (no academic content integrated) over ICBPA in certain situations. It was apparent that some of the activities were too complicated for the kindergarten and grade one class. The kindergarten and grade one teacher’s story of Michael, who could not follow the multiple instructions during some of the activities, but he understood how to move is an example of a situation in which she would prefer to choose to just have the children move. Sometimes students did not participate in certain activities because the curricular content embedded in the activity was content they had not yet grasped. Thus, they grew frustrated and would act out or not want to take part anymore. This challenge was caused by the activities chosen and how they were explained; it was not the fault of the children who struggled to participate. This finding aligns with developmental research indicating that asking young children to remember the rules of a new activity, remember the overall classroom rules, recall material they have recently been taught, all while exhibiting motor skills that may also be new to them is cognitively taxing. These

cognitive processes require focused attention, inhibition, and motor control and are fairly sophisticated processes for children in kindergarten (Becker et al., 2014).

By choosing to remove the academic content from the activity, the kindergarten and grade one teacher thought that more students would participate in the classroom-based physical activity. Accordingly, if more students participated in the activity, then there would be more students' on-task afterward. The teacher also stated that integrating academic curriculum into the activities may be easier when she knew that all the students comprehended the material and the activity would be more of a review.

This suggestion of using classroom-based physical activity that does not integrate academic content when necessary is a worthy recommendation. Many studies have shown that there are academic benefits to physical activity done in the classroom that does not integrate academic content (Webster et al., 2015). Only one study has been conducted that examined the differences between classroom-based physical activity that integrated academic content and classroom-based physical activity that did not integrate academic content. Findings from this study showed there were greater improvement on math scores for the students exposed to the classroom-based physical activity that integrated academic content (Vazou, 2014). Since this was one study examining one outcome, future research should further investigate the differences in classroom-based physical activity that does and does not incorporate academic content. Despite the need for further research, it is important to reinforce that physical activity alone still has academic benefits, and thus teachers should be encouraged to use physical activity in the classroom in all forms. Given the diversity of the learners and their abilities in every class it is important that teachers have many tools in the toolbox when it comes to incorporating physical activity into the classroom.

Within the grade four and five classroom, the findings on customization of classroom activity concentrated on making the activities fun. The teacher and her students stated multiple times that it was important for the activities to be fun and that the activities with competition were the most enjoyable. This finding on the importance of student enjoyment was also seen in another qualitative study looking at the perceptions of

teachers on ICBPA (McMullen et al., 2014). In the study by McMullen and colleagues (2014), results showed that whether the students perceived the ICBPA as fun or not strongly influenced whether the teacher utilized ICBPA. These findings suggest that teachers who want to use ICBPA should focus on making the activities fun and possibly competitive for the students. When students enjoy ICBPA, teachers are more motivated to use ICBPA. Including elements of fun into daily classroom activities can increase student engagement and learning (Minchew & Hopper, 2008).

In this study, the teachers wanted the researcher to administer the ICBPA during the interventions. The teachers explained they would feel more comfortable watching the researcher administer the ICBPA so that they could learn through observation. After the interventions were complete, the teachers stated they felt more confident in delivering ICBPA because they had watched the researcher conduct them with their classes on multiple occasions. This finding aligns with the results from a recent study that examined three different methods for promoting the use of ICBPA. The three methods included training only, training plus facilitator support, and training, facilitator support, and a social marketing campaign. Results indicated that teachers in both the facilitator supported conditions utilized the ICBPA more often and had greater self-efficacy for their use (Delk, Springer, Kelder, & Grayless, 2014). This suggests that it is important to provide enhanced support and training for teachers on the use of ICBPA. Merely, providing a book on ICBPA may not be sufficient to promote its use.

There is an increasing trend for embedded professional development in schools. Embedded professional development is teacher learning that is integrated into their day-to-day teaching practices with the goal being enhanced instruction and improving student learning (Croft, Coggshall, Dolen, Powers, & Killion, 2010). Having one-on-one professional development assistance in the classroom would be an excellent professional development strategy for ICBPA. A professional development ICBPA specialist could assist teachers in their actual classrooms and help them learn to integrate ICBPA in a real world classroom setting. However, it would be important that the facilitator assisting in integrating ICBPA have training on teaching children of the specific age group they are

going to be working with. A limitation of having myself, the researcher, administer the ICBPA was that I was not trained as a teacher. Although I have spent my career working with children I was not nearly as knowledgeable on classroom management as a trained teacher. If a person with teacher training led the intervention they may have anticipated the need for rules that encompass all of the activities and had effective strategies to implement those rules.

This qualitative study with Indigenous teachers and students revealed similar findings to other qualitative studies with non-Indigenous participants. The results from this study were similar to the findings from a study looking at the perceptions regarding ICBPA of teachers, who were not Indigenous, but who work with Indigenous children (McMullen et al., 2014). The similarity in findings with Indigenous teachers and non-Indigenous teachers is important. Although this study only had two teachers, these findings may indicate that few, if any, changes need to be made when using ICBPA with Indigenous children. The issues that do need to be addressed, such as threats to classroom management, are universal to all teachers. Nonetheless, this comparison should be taken with caution; future research on this matter is necessary to ensure these similarities exist outside of this study.

One change that could be made when using ICBPA with Indigenous children is modifying some of the content to reflect the Indigenous knowledge from the students' local community. Integrating Indigenous knowledge into education for Indigenous students is a promising practice (Canadian Council on Learning, 2009). A key feature in the integration of Indigenous knowledge and pedagogy is having students learn by doing, learning through experience, and learning through enjoyment (Battiste, 2002). Indigenous knowledge can be embodied by students through the use of songs, ceremonies, and symbols when teaching (Battiste, 2002). For example, instead of having the kindergarten children mimic zoo animals during an ICBPA have them mimic animals that are local and important to their community while a teacher shares knowledge on the importance of that animal. This is just one example of using ICBPA to teach students about Indigenous knowledge through enjoyment and experience.

4.5 Conclusion

The findings from this study illuminate the perceptions of Indigenous teachers and students who have engaged in the use of ICBPA. Three unique perspectives were brought together: an early elementary-years teacher, a teacher of older elementary children, and grade four and five students. Results indicated that teachers valued ICBPA because they felt it helped them provide their students with more opportunities to be active and improved some academic outcomes. However, the teachers were also forthcoming with what they perceived as limitations of ICBPA. Both teachers believed that ICBPA increased classroom management issues and the kindergarten and grade one teacher felt that ICBPA were sometimes too challenging for her young students. When promoting ICBPA, there needs to be sensitivity to the dynamic conditions in classrooms and the stresses that teachers encounter (Webster et al., 2015). In an effort to reduce classroom management issues, training and facilitation for current teachers and pre-service teachers is necessary. This includes helping teachers develop rules for students engaging in ICBPA that are specific to their classroom and students. Moreover, encouraging teachers to use classroom activity that does not integrate academic content when they feel that academic content can not be integrated is also a recommendation coming from the teachers in this study.

ICBPA is an effective tool for teachers in First Nations schools. ICBPA requires minimal space compared to other forms of physical activity and very few supplies are needed. It can reduce classroom behavioural issues and students enjoy it. It is crucial not to underestimate the importance of making school enjoyable for Indigenous children. Classroom engagement is a protective factor to the high disengagement and dropout rates for Indigenous students (Congress of Aboriginal Peoples, 2010). Last, this study represents a small, but important, step in furthering the body of evidence-based practices on engaging Indigenous students and promoting academic success.

Chapter 5: General Discussion and Conclusion

5.1 Summary of Findings

The objectives of this dissertation were to examine the effect of ICBPA with on-task behaviour for Indigenous children, and to understand the perceptions of teachers and students who participated in the ICBPA intervention. Study 1 examined the effects of ICBPA on the on-task behaviour of Indigenous children in grade four and five at Whitecap Elementary School on Whitecap Dakota First Nation. On-task behaviour was assessed for thirteen participants through direct observation. The ICBPA intervention may have been effective in improving the on-task behaviour of the participants in study 1; however, there was a regression to the mean limitation that may indicate that the intervention was not the reason the participants improved their on-task behaviour scores. Study 1 also contributed to the lack of empirical research on effective instructional methods for Indigenous children.

Study 2 was a progression from study 1 using a similar methodological approach with a younger age group. This study assessed effects of ICBPA on the on-task behaviour of nine Indigenous children in kindergarten and grade one at Whitecap Elementary School on Whitecap Dakota First Nation. Results from this study showed that ICBPA improved the on-task behaviour of the participants. This study was the first to examine on-task behaviour and ICBPA with kindergarten children. The results of study 2 contributed to research on ICBPA, on-task behaviour, early years behaviour, in an Indigenous classroom.

The third study in this dissertation gathered the perspectives of the Indigenous teachers and students who took part in the two ICBPA interventions at Whitecap Dakota Elementary School. It is important to understand the perceptions of the educators and students who have experienced ICBPA as it is unlikely that teachers will use ICBPA if they or their students perceive it negatively (Goh et al., 2013; McMullen et al., 2014). Moreover, it is important to understand the barriers and facilitators to implementing ICBPA so that activities can be adapted to help teachers overcome those barriers and utilize available facilitators (Goh et al., 2013). Four themes emerged from the findings of

study three depicting barriers and facilitators to using ICBPA. These themes discussed the importance of physical activity and academic benefits, classroom management issues, the need to tailor classroom activity, and student desire for competition and enjoyment of ICBPA.

5.2 Application of Findings and Future Research

Taken together, the three studies in this dissertation provide important information to researchers, school administrators, teachers, and community leaders interested in increasing student academic achievement. Including the two intervention studies in this dissertation, eight studies now exist with respect to on-task behaviour and ICBPA. Among these eight studies the two in this dissertation are the first with Indigenous children. Previous research and the studies in this dissertation have shown improvements in on-task behaviour with the integration of ICBPA, the improvements in on-task behaviour range between 2% to 20% (Carlson et al., 2015; Grieco et al., 2009; Ma et al., 2014; Mahar et al., 2006; Mullender-Wijnsma et al., 2015; Riley et al., 2015).

The study design, intervention, and methods in this dissertation were very similar to those used by Mahar and colleagues in their 2006 study examining on-task behavior and ICBPA with grade three and four students. This is a strength of the research presented in this dissertation, as replication of interventions is rarely done in Kinesiology (McPherson, 1978; Rotheram-Borus, Rebchook, Kelly, Adams, & Neumann, 2000). Replication is a valuable scientific exercise as it helps ensure that findings and theories hold true over time and in similar, but different, contexts (McPherson, 1978). Basing policies or other decisions on a single study and not cumulative explanatory knowledge is not advisable as there is little evidence that similar results will be produced (McPherson, 1978; Rotheram-Borus, Rebchook, Kelly, Adams, & Neumann, 2000).

Future research is needed to address the dose-response question. Determining the frequency, intensity, and duration of ICBPA required to increase on-task behaviour is an important next step in developing recommendations around ICBPA. Currently, the range of frequencies, intensities, and durations of ICBPA interventions is too large to come to conclusions about dose response or set benchmarks for intervention success (Norris et al.,

2015; Webster, Buchan, et al., 2015). In previous studies examining ICBPA and on-task behaviour, interventions ran from one week to three years. The lengths of the previous ICBPA interventions were between 4 and 20 minutes. The activities were most often delivered once a day, but some studies encouraged teachers to use them as much as possible. Rigorous controlled studies that compare different frequencies, intensities, and durations of ICBPA are needed. For example, a study that compares one vs. two vs. three ICBPA activities a day on children's on-task behaviour would help in making recommendations to teachers about how often they should use ICBPA. Similarly, a study that examines the effects of different ICBPA intensities on on-task behaviour would also facilitate recommendations on delivery of ICBPA.

Research should also be conducted to determine if increased on-task behaviour in ICBPA interventions is a result of the physical activity alone or the implementation of an innovative teaching approach. Only one study has examined the differences between classroom-based physical activity that integrated academic content and classroom-based physical activity that did not integrate academic content (Vazou, 2014). Results from this study indicated that integrated academic content assisted the children in being on-task more so than physical activity alone (Vazou, 2014). However, this is only one study and more research is needed to explore the differences between ICBPA and physical activity in the classroom.

Another research question to be explored is whether a break from learning curricular content can produce the same increases in on-task behaviour as ICBPA. Research on recess, a time when children are allowed to take a break from learning academic content to play and socialize with friends, indicates that children are more on-task after recess than before (Pellegrini & Bjorklund, 1997). During recess some students engage in a high level of physical activity and some do not (Pellegrini & Bjorklund, 1997), thus it is challenging to determine if it is the physical activity or the break alone that causes the increase in on-task behavior afterwards. To my knowledge there has not been a study that examines whether a break from learning, where the students are allowed to engage in free time but not physical activity, produces the same increase in on-task

behaviour as ICBPA. A better understanding of whether it is the physical activity or the break in learning that enables students to be more on-task when engaging in classroom activity is needed.

The research approach used in this dissertation may also provide researchers with some guidance for future projects on classroom-based physical activity and Indigenous communities. Through the use of participatory action research, this study was designed and conducted with school leaders and teachers. There has been an absence of classroom-based physical activity interventions developed with teachers, that are tailored to specific school environment factors such as student numbers, classroom sizes, and number of students with behaviour issues or disabilities (Norris et al., 2015). Without teacher and school leader input at the development stage, classroom-based physical activity lesson interventions may not have the support needed to be fully implemented and sustained (Norris et al., 2015). In this research, the teachers also played a key role in conducting the research by welcoming me into their classrooms, allowing me to collect data while they were teaching, and making time in their lessons to allow students the opportunity to engage in ICBPA. The teachers also managed their classes in a way that supported this study. For example, they would remind students to not interrupt me when I had my headphones on during data collection and re-worked lesson plans to facilitate the ICBPA interventions halfway through their lessons.

The need to develop physical activity interventions in collaboration with teachers and leaders is even more evident in Indigenous communities (Robinson, Borden, & Robinson, 2013). Physical activity interventions involving Indigenous students should be developed in collaboration with community to ensure the outcomes, processes, and activities are important and relevant to the community for which they are designed (Mushquash & Bova, 2007; Oosman et al., 2016). To do this, previous successful physical activity interventions with Indigenous communities have used participatory research methods (Macaulay et al., 1997; McHugh & Kowalski, 2009; Oosman et al., 2016; Paradis et al., 2005; Saksvig et al., 2005). For example, Oosman (2016) and colleagues sought to determine what the priorities were in a Métis community in regards

to the health of their children prior to collaborating on a school-based intervention. Through a participatory action research model she worked with a diverse community advisory team and conducted focus groups. The findings produced from the focus groups and information gathered from the community advisory team informed the intervention and ensured that the intervention was reflective of the community's needs and values (Oosman et al., 2016).

The concept of two-eyed seeing has been increasingly explored over the past decade. This concept, developed by Mi'kmaq Elder Albert Marshall, refers to learning to see from one eye the strengths of Indigenous ways of knowing and local knowledge and from the other eye Western ways of knowing, and then using both eyes together to respectfully bring together different expertise (Hatcher, Bartlett, Marshall, & Marshall, 2009). When the perspectives of Western knowledge and Indigenous knowledge are viewed together the result is a new perspective produced by going back and forth between one's own understanding and those of others. This approach is being increasingly used in education so that Indigenous students are able to learn Indigenous knowledge while attending schools founded on Western knowledge (Hatcher et al., 2009). Similarly, Ermine's (2007) concept of ethical space advocates for those with Western worldviews and those with Indigenous worldviews to meet in a space between their two spheres of culture and knowledge. When working in an ethical space individuals recognize each other's separate traditions, values, social systems, and histories (Ermine, 2007). This recognition assists in the understanding of research issues and priorities (Ermine, 2007). Both of these models, and those who work to incorporate them into their research, are contributing to a process of decolonizing research.

Decolonizing research is concerned with having a more "critical understanding of the underlying assumptions, motivations, and values that inform research practices (Tuhiwai Smith, 1999). When the concepts of two-eyed seeing (Hatcher et al., 2009) and working within an ethical space (Ermine, 2007) are actualized Indigenous and non-Indigenous experts, leaders, and researchers work together to understand a topic from both Western and Indigenous perspectives. This, in turn, assists both parties in

understanding each other's assumptions, motivations, and values. It is not to be said that either party has to relinquish their way of knowing, but ideally embrace both (Hatcher et al., 2009). This mutual understanding and respect for dual worldviews can be the cornerstone of decolonizing research (Ermine, 2007; Hatcher et al., 2009; Tuhiwai Smith, 1999).

Throughout the processes of engaging Whitecap Elementary School, collaborating on designing the research projects, conducting the research, and activities when the research concluded I have made earnest efforts to engage school leaders, teachers, staff, and students, while at the same time participating in the everyday happenings of the school and giving my time and effort where opportunity arose. In addition to these very visible efforts I also attempted to keep in mind my assumptions, motivations, and values in an effort to move towards a greater understanding of decolonizing research. One of the greatest lessons I learned throughout the process of conducting this research was balancing the conceptual with reality. To this I mean following the recommendations for community engagement in an effort to work towards the goal of decolonized research, while at the same time working within the constructs and realities of what I was doing and who I was doing it with.

I experienced this challenge at the first meeting I had with teachers and staff at the school. My goal going into the meeting was to discuss physical activity and children and see where our discussions would go. We had a great conversation about physical activity and everyone seemed interested in collaborating on a project of some type. I kept my thoughts and ideas tucked away, as I wanted the school community to direct the project. However, it became quite obvious a short while into the meeting that they were interested in what I had to say, what I had to offer, and what my ideas were. I knew I was in a room full of dedicated educators. I also knew that these dedicated people were busy people, people who had families to get home to and volunteer commitments to go to. They seemed keen to get the ball rolling. So I spoke about my interest in physical activity and learning and it was apparent that everyone was interested. I quickly heard "What do you mean by learning", this was, after all, a room full of teachers. And so the

conversation moved to measurable outcomes. I shared what outcomes other relevant studies had examined in the past and as I spoke about on-task behaviour I heard comments such as “It sure would be nice to have my kids more on-task”. There was quickly unanimous agreement that on-task behaviour and physical activity would be something worthy of investigation. In one meeting we had laid the foundation for our research. That was by no means the goal of the meeting, but that was how the events occurred.

After a few months of drafting a research proposal it was ready to be presented to Chief and Council. I had assumed I would be the one to present it and I was looking forward to getting the perspectives of community leaders on the projects we had planned to undertake. However, the protocol for school-based projects and collaborations was that the school principal would present the project to community leaders at their regular monthly meetings. Although I did express my desire to present the work I was informed in a very polite way this was how it was done “out here”. I grappled with this internally; as it did not support what I had been taught. However, that was what the community wanted, and part of research with Indigenous communities is following their protocols.

These events, and others, have led to this project having less community engagement than I had desired. Although the school was very engaged in the project there was limited engagement by other community members. It may be that the values of the greater community were reflected in this work, as the school was at the heart of the community. But I do not doubt that the research I conducted would have been strengthened by greater input from the community. In future collaborations with this community, or any Indigenous community, I feel it will important to seek out ways to engage diverse members of the community, not just members of the school community.

Future research should also examine effective strategies to disseminate knowledge about the multiple benefits of physical activity on learning for Indigenous communities. Active Living Research, an American organization, and national and provincial organization such as *Participaction, Physical and Health Education Canada*,

and *Saskatchewan In Motion* are leaders in physical activity promotion and knowledge dissemination. Research briefs, reports, and infographics developed by these organizations summarize evidence, highlight promising practice, and translate evidence for the non-research community on the effects of physical activity on learning. Strategies focusing on how to share this information with Indigenous communities, including leaders, teachers, and parents is an endeavor that warrants attention. Evidence is continuing to demonstrate that physical activity is important for learning, but this does little good unless the information is known and acted upon, reducing what is known as the know-do gap (Estey, Smylie, & Macaulay, 2009). Contextualizing research is essential in communicating evidence to Indigenous communities (Estey et al., 2009). Other strategies for disseminating knowledge with Indigenous communities include asking community leaders to share information, tailoring information strategies to local Indigenous knowledge and cultural systems, and working with communications and media experts experienced in knowledge translation with Indigenous communities. (Estey et al., 2009).

I have worked to disseminate the findings from these studies to the Whitecap community and to others who influence the physical activity opportunities available to Indigenous children and youth. Last year, I had the opportunity to share the findings from my work with superintendents, consultants, and schools based administrators in the Saskatoon Public School Division. All in attendance were engaged in the presentation and round-table sessions, and were interested in implementing classroom-based physical activity in their schools with the resources I shared with them. I also did a presentation for the teachers, staff, and administrators at Whitecap Elementary School on findings from the research we had collaborated on. At this presentation all school staff and teachers were present, including one of the teachers who I collaborated with. The other teacher with whom I worked with had taken a position at another school at the beginning of that school year. After presenting the findings the teacher involved in the study shared her experiences and explained to the other teachers how she initially felt her students were more off-task after the ICBPA but the data showed that they were more on-task. I

put out copies of the Energizers activity books on a table near the entrance to the room and I was pleased to see that nearly all of the teachers had picked up a copy as they left.

In addition to disseminating the knowledge gained in the study with the teachers and staff, I also shared the findings with the parents of all the students at Whitecap Elementary School. The document discussed findings from my research at Whitecap and also presented other information parents might want to know about physical activity and academic success (Appendix J). I am currently working with Chief and Council's administrative assistants to find a date to present the work I collaborated on with the school to them.

An additional area in need of investigation is Indigenizing the content of ICBPA. Indigenizing content can be done by infusing Indigenous culture and language into curriculum (Preston, 2015). Key features of Indigenous pedagogy are learning through experience and learning through enjoyment (Battiste, 2002; Preston, 2012). ICBPA may be well suited to the integration of Indigenous knowledge, as it is an instructional method that brings together movement, teaching, and enjoyment. The use of stories and songs are often used to teach Indigenous knowledge (Battiste, 2002). Some ICBPA currently incorporates songs and stories; including Indigenous songs and stories would be a straightforward way to introduce Indigenous knowledge.

The process of Indigenizing ICBPA would require extensive community input from language keepers, Elders, and others richly endowed with Indigenous knowledge. Many assume that Indigenous teachers have extensive knowledge of Indigenous pedagogy and are informed on Indigenous language and culture, but the reality is that many Indigenous teachers feel just as unprepared as non-Indigenous teachers who are asked to incorporate Indigenous knowledge into their practice (St. Denis, Bouvier, & Battiste, 1998). Thus, it would be important that the task of Indigenizing ICBPA was not placed solely on the shoulders of Indigenous teachers.

I believe that the findings from these studies may provide guidance to school administrators and teachers who would like to implement ICBPA in their schools and classrooms in both Indigenous and non-Indigenous communities. Many of the qualitative

and quantitative findings in this dissertation were consistent with similar research with non-Indigenous participants. Thus, the findings from this dissertation may be relevant to educators in similar settings in both Indigenous and non-Indigenous communities.

If a teacher wanted to implement ICBPA in their classroom, study 3 provides many important findings. The qualitative descriptions of possible solutions to the challenges associated with ICBPA are from teachers who experienced ICBPA first hand. Teachers value the opportunity to learn from other teachers (Avalos, 2011; Kedzior & Fifield, 2004). The unique and rich descriptions in study 3 of strategies to address the challenges of ICBPA re-affirmed my passion for qualitative research and confirmed my choice of mixed-methods. It is one thing to run an intervention and obtain successful results as defined by a dependent variable, but without the qualitative interviews there would be no descriptive research to provide context and strategies associated with ICBPA. This descriptive research can assist teachers in addressing real-world challenges that may occur when providing ICBPA (Webster et al., 2015). Future research should focus on further investigating the transferability of these qualitative findings. For example, the teachers in study 3 felt that it was important to be able to use ICBPA at certain times and just incorporate physical activity without academic content at others. Examining whether other teachers take the same approach or would like to take this approach would be important. Moreover, determining when teachers want to use ICBPA and when they to use physical activity alone would be important. Such information could lead to further investigating the dual roles of physical activity and integrated academic content in promoting on-task behaviour. Looking forward, research should also begin to determine what methods of implementing ICBPA might work best in certain classrooms, as there is much variability in individual classrooms (Webster et al., 2015).

5.3 Limitations

The primary limitation in this dissertation was the inadequate amount of data to analyze differences in physical activity between the non-active lesson phase and the active lesson phase. Accelerometers were worn to assess the physical activity of the student participants in studies 1 and 2. The accelerometers were to be worn Monday

through Friday from 8:45am to 3:15pm and kept in baskets in the classrooms when not being worn. The students were instructed to put the accelerometers on when they came to class in the morning and take them off before going home. The teachers were asked to ensure that the accelerometers were distributed and collected each day. Despite careful instruction to both the teachers and students there was a low level of compliance for wearing the accelerometers, which resulted in an inadequate amount of data to further analyze differences in physical activity between the non-active lesson phases and the active lesson phases in both studies.

In the grade four and five class there was a mean of 3.18 valid wear days for the non-active lesson phase where physical activity was assessed during the school day when participants did not receive the ICBPA intervention. In the active lesson phase, there was a mean of 2 valid wear days. It could be argued that 3.18 valid wear days could be representative of the 5 day non-active lesson phase, however, 2 valid wear days is not representative of a 10-day active lesson phase (Rowlands, 2007).

In the kindergarten and grade one class, there was a mean of 2 valid wear days for the non-active lesson phase where physical activity was assessed during the school day when participants did not receive the ICBPA intervention. In the active lesson phase, there was a mean of 4 valid wear days. Two valid wear days is not representative of a five-day non-active lesson phase. Four valid wear days in the active lesson phase, which was 10 days long, could be acceptable, however, due to lost and defective devices (discussed below) that mean was based on three participants data. Thus, it is probable that both the non-active lesson phase and active lesson phase accelerometer data is not a valid representation of the physical activity accrued by the participants in both those time periods.

Three factors contributed to this limitation. The first was related to the design of the study. A non-active lesson phase of only five days was sufficient to acquire baseline on-task data; however, it was not an ideal length of time to measure physical activity given that four valid wear days is an acceptable number of days to establish physical activity norms (Rowlands, 2007). The second issue was related to student compliance for

wearing the accelerometers. The grade four and five students did not want to wear the accelerometers because they did not like the way they looked when they wore them. The children told me that the accelerometers “looked stupid”. Their teacher explained in the qualitative study that she felt “they are at that stage where they just want something to rebel against”. The kindergarten and grade one students would often take the accelerometers off and play with them at various places around the school and then would lose track of where they left them.

Some students in both classes accidentally wore the accelerometers home. The children did not bring them back to school despite the teachers calling home requesting the accelerometers be brought back to school. Often when one of the teachers called home to inquire about the accelerometers, the parents would explain that they could not find the accelerometer. Frequently, a few days later the accelerometer would be found and returned to school.

Another factor that affected the collection of physical activity data was students frequently coming late to school or leaving early. If students came late, the teachers would be teaching and forget to remind those students to put on their accelerometer. Likewise, if students left early, the teachers would not get the opportunity to retrieve the accelerometers from the students before they left. I was often present at the start of the school day and at the end of the school day and assisted in reminding the students to put on or take off their accelerometers. However, as I was running two interventions in two different classrooms and assisting in various capacities around the school I was not always able to be in the classrooms. Under these circumstances I found it challenging to help keep track of participant accelerometer compliance.

The third issue that negatively affected the collection of physical activity data was low participant numbers. With thirteen and nine participants, respectively, it was important to have the majority of the students provide accelerometer data. However, with students losing accelerometers and the loss of data due to two defective devices, there were very few students in the kindergarten and grade one class who provided accelerometer data. For example in the active lesson phase [intervention] with the

kindergarten and grade one class there were three participants who provided accelerometer data. This was due to lost accelerometers in the previous non-active lesson phase; lost accelerometers in the active lesson phase, and two defective accelerometers, which were presenting 24-hour wear time.

This lack of accelerometer data prevented the generation of findings on physical activity response to ICBPA. If a promoted benefit of ICBPA is increased physical activity, it is critical to provide evidence that students do indeed increase physical activity as a result of ICBPA. In future research, a variety of strategies to increase accelerometer compliance could be utilized. The use of rewards such as gift cards or movie tickets has been recommended as a promising practice to increase accelerometer compliance with children (Trost et al., 2005; Van Coevering et al., 2005). To assist the teachers in ensuring the students put on and remove the accelerometers, it may be helpful to involve educational assistants in reminding children to put on and take off accelerometers.

A second limitation present in study 1 and study 2 was that I was the person who ran the intervention activities, not the classroom teachers. Both teachers stated they would feel more comfortable if I ran the ICBPA so that they could watch and learn. Because I delivered the intervention the interval validity of the study was increased and the intervention was delivered as planned; however, this resulted in a lack of ecological validity. There is a reduced generalizability of the findings from study 1 and 2 to real classrooms because teachers may not make the time every day for two ICBPA interventions, and they may not work as hard to get all the students involved. Having invested interest meant that I was always enthusiast and encouraging when running the interventions. It is probable that teachers may not project the same level of eagerness all of the time when using ICBPA, which may affect student engagement.

Another limitation of study 1 and 2 was that the research assistant and I were not blinded to the hypothesis or what phase the studies were in (non-active phases or active phases). Both of the people collecting the on-task data were aware of the proposed explanation of the findings and knew what their studies sought to support. Likewise, study 1 and 2 would have been strengthened if the research assistant and I were not aware

of whether we were collecting on-task data in the control or intervention phases of the studies. However, this would be challenging, as I was the person conducting the intervention activities. Furthermore, even if research assistants were brought in to collect the on-task data and then asked to leave when the time came to either run the intervention or wait 10 minutes (active phase) they would still be able to clearly see that the children were just active when they were brought back in to collect data after the intervention.

The order in which the phases of the research were placed in studies 1 and 2 was also a limitation. In both study 1 and 2, the non-active phase preceded the active phase. Thus, there is the possibility that the participants were more on-task in the intervention phase after the ICBPA because it was conducted at a later time. One way to partially address this issue would have been to have one more non-active phase, where no intervention is delivered, after the active phase. A final limitation present in this dissertation is the regression to the mean issue evident in study 1. In the findings of study 1 there was a significant difference between the on-task scores at the beginning of the lessons in the non-active phase and the on-task scores from the beginning of active lesson phase. It is possible that the participants were more on-task at the beginning of the non-active phase classes and consequently more likely to decrease in their ability to stay on-task. While in the active phase the participants started less on-task and, accordingly, were more able to increase their ability to stay on-task.

5.4 Conclusion

This results presented in this dissertation have shown that ICBPA may improve the on-task behaviour of Indigenous children in kindergarten, grade one, grade four, and grade five. Furthermore, the perspectives of the students and teachers in this study indicated that ICBPA could potentially be tailored to meet the needs of their students and adapted to address the primary barrier of utilizing ICBPA, threats to classroom management. Qualitative findings also indicated that both students and teachers valued some aspects of ICBPA because of its effect on learning and because it offers the opportunity for more physical activity during the school day.

ICBPA may be well suited for Indigenous communities and schools because of the unique attributes and benefits associated with this instructional approach. ICBPA can be done in almost any classroom and does not require equipment, gym scheduling, or specific clothing. Many on-reserve schools face enormous challenges in providing quality educational experiences for their students due to under-funding and poor infrastructure (Haldane, Lafond, & Krause, 2013). ICBPA is a tool that on-reserve educators can use in the face of these challenges because it is not contingent on funding for programming or infrastructure.

Of all the synergistic benefits of ICBPA, it is important to note that the students who took part in the studies in this dissertation, and students who have taken part in other ICBPA studies, enjoyed ICBPA (McMullen et al., 2014; Vazou & Vlachopoulos, 2014; Webster et al., 2015). Including elements of fun in daily classroom activities can increase student engagement and learning (Minchew & Hopper, 2008). Enjoyment of classroom learning activities is a protective factor to the high disengagement and dropout rates of Indigenous students (Congress of Aboriginal Peoples, 2010). Accordingly, ICBPA has the potential to assist Indigenous students in learning in the interim, by increasing their ability to stay on-task, but also in the future by increasing their engagement in school.

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Appendix A – Consent Letter for Teachers



CONSENT LETTER (Educator)

Project Title: The Effects of Integrated Classroom-Based Physical Activity on On-Task Behaviour and Physical Activity Levels for Aboriginal Children.

Principal Investigator:

Dr. Louise Humbert
College of Kinesiology,
University of Saskatchewan
Louise.humbert@usask.ca

Student Investigator:

[Serene Kerpan, PhD Candidate](#)
College of Kinesiology,
University of Saskatchewan
(306) 380 – 3202
serene.smyth@usask.ca

FUNDING

Funding for this project comes from a Canadian Institutes for Health Research Doctoral Grant

INVITATION

We would like to ask for your assistance with a study that is being carried out by the College of Kinesiology at the University of Saskatchewan. This project is designed to examine whether integrated classroom-based physical activity improves on-task behaviour for elementary school children. We anticipate that this evidence-based information could be used to assist in the development of classroom-based physical activity program that enhance the learning abilities of elementary school children.

WHAT'S INVOLVED

As a teacher you will be asked to communicate with the student researcher regarding your schedule and any changes to it during the study f (3 weeks).

During the first week of the study the student research and another research assistant will be observing how on-task the students are in your class. The observation process is non-invasive; the researchers will be sitting at the back or side of the classroom watching the students and writing on their clipboards for half an hour intervals. Four 30-minute intervals will be measured on three separate days in the first week.

During the following two weeks, which is the intervention period, the same on-task measures will be taken, but the students will get two 10-minute physical activity breaks every day. The breaks will occur once in the morning and once in the afternoon. You are encouraged to join in or help run the activity break, but not required to.

You will be asked to assist the student researcher in selecting already developed physical activities that fit in with the lessons you are delivering during the duration of the intervention period (2 weeks). The activities we are using are called Energizers and they are physical activities that integrate some curricular content (e.g. math or spelling).

At the end of the study you will be asked to sit down with the researcher for a short interview (approximately 30 minutes) that will be audio recorded with your permission and talk about how the study went. You can request that the interview is terminated at any point and you can also request the audio recording device is shut off at any point. After your interview, and prior to data being included in the final report, you will be given the opportunity review the transcript of your interview, and to add, alter, or delete information from the transcripts as you see fit.

POTENTIAL BENEFITS AND RISKS

There are no known or anticipated risks associated with participation in this study.

The benefits likely to be gained through this research project are:

- Learning how short physical activity breaks affect the on-task behaviour of students.
- Opportunity for assistance in running an in class short physical activity break program that can be continued on after the research process is complete.

PUBLICATION OF RESULTS

The aggregate results from this project will be made available to the researchers, school administrators, parents, and community members. The aggregate results may also appear in printed or published reports such as journal articles. The final report for this project will be given to you after the study is completed.

CONFIDENTIALITY

The interview will be recorded and transcribed. Only a study number and not your name will be associated with your interview. All information you provide will be considered confidential. If we chose to use a quote you have provided when we disseminate the

results we will use a pseudonym and we will not use quotes that make you easily identifiable. However, because there are only a few teachers involved in this study, and you know each other, it is possible that you may be identifiable to other teachers in the study based on what you have said.

Access to interview data will be restricted to the Principal researcher, Dr. Louise Humbert, and the student researcher, Serene Kerpan. Your name will not appear in any thesis or report resulting from this study. All data will be kept in a locked filing cabinet in the office of Serene Kerpan. After analysis of all data, Dr. Louise Humbert, College of Kinesiology, will assume responsibility for data storage for five years upon completion of the study.

In the future, when results of this study are disseminated there may be an opportunity for individual authorship on presentations and journal articles. If this opportunity arises, and you chose to be an author your name will be published.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty. If you decide to withdraw the information you have shared with us will be withdrawn from the data collected. Your right to withdraw from the study will apply until the data has been disseminated. After this it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your data.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the principal investigator or the student researcher. This study has been reviewed and received ethics approval through the **Research Ethics Office at the University of Saskatchewan (toll free: 1-888-966-2975) (ethics.office@usask.ca)**. If you have any comments or concerns about your rights as a research participant, please contact the Research Ethics Office.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

Consent to Participate

I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I agree to participate in the study described above, understanding that I may withdraw my consent prior to the dissemination of the results. A copy of this consent form has been given to me for my records.

(Signature of Participant)

(Date)

(Signature of Researcher)

Consent for Visually Recorded Images/Data:

Parent/guardian to provide initials:

- Photos may be taken of me for: Dissemination* _____
- Videos may be taken of me for: Dissemination* _____

*Even if no names are used, you may be recognizable if visual images are shown as part of the results.

Appendix B – Consent Letter for Parents



CONSENT LETTER (Parent)

Project Title: The Effects of Integrated Classroom-Based Physical Activity on On-Task Behaviour and Physical Activity Levels for Aboriginal Children.

Principal Investigator:

Dr. Louise Humbert
College of Kinesiology,
University of Saskatchewan
Louise.humbert@usask.ca

Student Investigator:

[Serene Kerpan, PhD Candidate](#)
College of Kinesiology,
University of Saskatchewan
(306) 380 – 3202
serene.smyth@usask.ca

FUNDING

Funding for this project comes from a Canadian Institutes for Health Research Doctoral Grant.

INVITATION

We would like to ask for your assistance with a study that is being carried out by the College of Kinesiology at the University of Saskatchewan. This project is designed to examine whether classroom-based physical activity that re-enforces concepts being taught in class improves on-task behaviour for elementary school children. We anticipate that this evidence-based information could be used to assist in the development of classroom-based physical activity program that enhance the learning ability of elementary school children.

WHAT'S INVOLVED

This study is three weeks in length. As a participant, your child will be asked to wear a physical activity monitor (Accelerometer) for all three week of the study. The accelerometer is a small device the size of a toonie that's worn on a belt provided to the student. In order to program the accelerometer we will need to measure your child's height and weight. Your child will also be asked to participate in two 10-minute physical activity breaks in class each day for the last 2 weeks of the study. Right before and right after the physical activity break the on-task levels of the children in the involved classrooms will be measured. The observation process is non-invasive; the researchers will be sitting at the back or side of the classroom watching the students and writing on their clipboards for half an hour intervals.

At the end of the three-week study your child will be asked to join in on a focus group interview. The purpose of the focus group is to learn what the children liked about the physical activities they did in the classroom, what they didn't like, and what they believed the effects to be.

POTENTIAL BENEFITS AND RISKS

Measuring activity levels of children using Accelerometers: There is no risk in wearing this device. The information collected will permit the research team to determine the activity levels of the children.

10-minute activity breaks: There is no risk in engaging in the activity breaks. The activity level is similar or less than what children would get in physical education class.

Assessment of on-task behaviour: There is no risk is assessing on-task behaviour. The information collected will permit the research team to determine if physical activity breaks help children stay more on-task while in class.

CONFIDENTIALITY

Only a study number and not your child's name will be associated with their on-task behaviour scores. All information will be considered confidential and grouped with data from other participants and thus your child's on-task behaviour scores will never be singled out with their names associated with the scores. Access to this data will be restricted to the Principal investigator the student researcher and a research assistant.

During the focus group interview the research will undertake to safeguard the confidentiality of the discussion, but cannot guarantee that other members of the group will do so. We will be asking the participants to please respect the confidentiality of the

other members of the group by not disclosing the contents of the discussion outside the group.

All data will be kept in a locked filing cabinet in the office of Serene Kerpan. After analysis of all data, Dr. Louise Humbert, College of Kinesiology, will assume responsibility for data storage for five years upon completion of the study.

VOLUNTARY PARTICIPATION

Your child's participation in this study is voluntary. If you wish, you may decline to have your child participate in this study. Further, if you do decide to have your child participate in this study you may withdraw your child from this study at any time and may do so without any penalty.

Your right to withdraw your child from the study will apply until the data has been disseminated. After this it is possible that some form of research dissemination will have already occurred and it may not be possible to withdraw your child's data.

PUBLICATION OF RESULTS

The aggregate results from this project will be made available to the researchers, school administrators, parents, and community members. The grouped results may also appear in printed or published reports such as journal articles.

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact the principal investigator or the student researcher using the contact information provided above. This study has been reviewed and received ethics approval through the **Research Ethics Office at the University of Saskatchewan (306-966-2084)**.

If you have any comments or concerns about your child's rights as a research participant, please contact the Research Ethics Office.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

Consent to Participate

I have read and understand the description of the research study provided above. I have been provided with an opportunity to ask questions and my questions have been answered satisfactorily. I understand that I may withdraw my consent to have my child participate at any time. A copy of this consent form has been given to me for my records.

I, _____ give permission to allow
_____ to participate in the study conducted by the College of Kinesiology.

(Signature of Parent/Guardian)

(Date)

(Parent/Guardian Contact Information)

(Signature of Researcher)

Consent for Visually Recorded Images/Data:

Parent/guardian to provide initials:

- Photos may be taken of my child for: Dissemination* _____
- Videos may be taken of me my child for: Dissemination* _____

*Even if no names are used, you [or your child] may be recognizable if visual images are shown as part of the results.

Appendix C – Verbal Assent for Student Participants



Assent for Participants (students)

All student participants in this study will be Elementary School Children. Verbal assent will be acquired from each participating student with the use of the following verbal statements below. Prior to seeking verbal assent from the individuals the project will be introduced to the entire class. This will ensure the students hear about the study twice and have time to think about questions they might have.

Assent Script to be verbally presented to each student in the class in which the research is taking place:

Why are we doing this project?

This study is going to help us learn if being active and moving around in the classroom helps students learn better. We want to ask you if you want to participate in the study.

What will happen during the study?

For three weeks you will be asked to wear an accelerometer. An accelerometer is a small device that measures how active you are. It's about the size of a toonie and you wear it on a belt we give you. You will put the accelerometer on in the morning when you get to school and take it off at the end of the school day. You won't feel the accelerometer it just sits on the belt all day.

During this study two researchers are going to be observing everyone in the class who participates in this study to see what they are doing during class time. Then for 2 weeks we are going to be doing some fun active games for 10 minutes two times a day. These

games will require you to get out of your desk and move around the room. Some of the games will involve jumping jacks, running, and playing with beanbags.

After the study is over we might ask you to talk with us about what you liked and what you didn't like about having these activities during class time. We would like to talk to you about these things with other students in a group. That way you can all share your thoughts and talk with your friends about the activities we did. When we talk with you in these groups we call them focus groups.

Who will know what I did in the study?

All of the information about what you do in class and what you tell us in the focus group will be a secret. The only people who will see the information about you is my friend helping me in the classroom, one person at the University that I go to school at, and myself. No other kids at the school or your teacher will see your information. Your name will never be on any papers that we share with other people. All of the information we get in the study will be kept on a computer with a password that only I know.

Do you have to be in the study?

You do not have to be in the study. No one will be mad at you if you don't want to do this. This study doesn't have anything to do with your usual schoolwork and you can still do all of the things you usually do in the class if you aren't in this study. Later on I will ask you by yourself if you want to participate. If you don't want to be in this study, just say no when I ask you. We will also ask your parents if they would like you to be in the study. Even if your parents want you to be in the study you can still say no. Also if you say yes now its ok to change your mind later and not be in the study any more.

What if you have any questions?

You can ask questions any time, now or later. When I ask you later if you want to be in the study I will ask you again if you have questions. Please ask as many questions as you like, questions are a good thing.

Are there good things and bad things about the study?

Good things (benefits): Some researchers like me have found that doing more activity during class time helps kids concentrate better. We aren't sure if it will help you

concentrate better, but there is a chance it will. Other kids have tested the games we will be playing and they said they were fun. So you might have fun playing these games.

Bad things (harms): There aren't any bad things that will happen in this study.

Do you have any questions?

Appendix D – Interview Questions for Study 3

Interview Questions for Educators

- 1) How long have you been teaching?
- 2) How long have you been teaching at Whitecap Elementary?
- 3) If you have taught at other schools, how is Whitecap different than other schools you have taught at?
- 4) What is your area of specialization?
- 5) What did you like about the Energizers activities?
- 6) What did you not like about the Energizers activities?
- 7) What did you feel were the outcomes? (Prompts-behavioural, activity level through day, productivity, quality of work, grades)
- 8) Do you think you will keep doing Energizers now that we are done the study?
 - ⇒ If yes, why?
 - ⇒ If no, why?
- 9) Would you recommend these activities to other teachers?
 - ⇒ Why, or why not?
- 10) Do you think there are barriers that some teachers face in regards to integrating more physical activity throughout the school day?
- 11) Did this research project alleviate any of these barriers?
- 12) If you were to design a program to get students more active in the classroom for the purpose of improving learning what would you do the same, and what would you do differently from Energizers?
- 13) We ran Energizers twice a day; do you think you would want to do them more or less if you continued to use them?

Interview Questions for Student Focus Group

Introduction: Remember how we have been doing those active games twice a day for the last two weeks in the morning and afternoon? Well now I was hoping I could ask you some questions about those games. Please put your hand up when you have something to say or if you want to ask a question. I really want to know what you think and I won't be mad at you if you say something bad about the activities, I want to make them better by learning what you think.

1) What did you like about Energizer activities?

- ⇒ Did you have any favorite games, why was this your favorite game?
- ⇒ Did you like how you were able to practice your math, spelling (insert other topics covered) when doing Energizers?

2) What didn't you like about Energizer activities?

- ⇒ Were there any games you really didn't like, if so why?
- ⇒ Did you dislike practicing your math, spelling etc?
- ⇒ What else did you not like about Energizers?

3) Did energizers make you feel any different after you sat back down to do your work?

Prompts- sitting still more, listening better, understanding the teacher, working harder.

4) Would you like to do Energizers more during the day or less?

5) What time of day did you like doing Energizers the most, in the morning or the afternoon?

6) If you could change the Energizers and make them just the way you wanted to them what would you do?

Appendix E – Individual Participant On-Task Behaviour Scores

<i>Study 1 Non-Active Phase Individual Scores</i>			
Participant	Beginning of Lesson	End of Lesson	Percentage Difference
1	69.33	57	-12
2	78	72	-6
3	58.83	53.6	-5
4	75.83	77	1
5	74.67	68.2	-6
6	65.33	62.8	-3
7	72.83	83.4	11
8	82.5	71.4	-11
9	83.33	84.4	1
10	84.67	72.4	-12
11	97.5	73	-25
12	80.17	62.4	-18
13	64.83	57.6	-7

<i>Study 1 Active Phase Individual Scores</i>			
Participant	Beginning of Lesson	End of Lesson	Percentage Difference
1	57.65	69.88	12
2	50.65	75.06	24
3	46.41	69.18	23
4	73.06	78.35	5
5	72.41	82.12	10
6	61.59	77.18	16
7	73.18	74.59	1
8	66.12	77.94	12
9	67.47	84.18	17
10	57.94	81.94	24
11	78.47	83.76	5
12	76.88	91.76	15
13	64.82	77.29	12

<i>Study 2 Non-Active Phase Individual Scores</i>			
Participant	Beginning of Lesson	End of Lesson	Percentage Difference
1	80.7	74.9	-5.8
2	64.3	54.3	-10
3	81.6	75.6	-6
4	83.8	73.3	-10.5
5	79.1	74.3	-4.8
6	87.1	77.1	-10
7	48.6	57.3	8.7
8	75.2	69.7	-5.5
9	74.9	69.8	-5.1

<i>Study 2 Active Phase Individual Scores</i>			
Participant	Beginning of Lesson	End of Lesson	Percentage Difference
1	64.8	83.7	18.9
2	65.1	76.9	11.8
3	70.3	86.8	16.5
4	68.2	89.8	21.6
5	70.1	90.3	20.2
6	83.4	95.3	11.9
7	57.8	62.8	5
8	85.4	95.4	10
9	70.4	86.4	16

Appendix F – Community Research Agreement

Community Research Agreement

Project Title: The Effects of Physical Activity on Learning for Aboriginal Children

Principal Investigator: Dr. Louise Humbert

Co-Investigator: Serene Smyth

1. Purpose of Agreement

This agreement is to help ensure that the research projects conducted with Whitecap Elementary School are respectful to the culture, language, knowledge, values, and laws of Whitecap Dakota First Nation and Whitecap Elementary School.

This memorandum is a tool to support the success of the project and the partnership between Whitecap Elementary School and the University of Saskatchewan. The school is to be involved as full partners in all aspects of the research (Participatory Action Research methodology); that includes feedback, input, analysis, interpretation and communication. The development and ongoing implementation of this project is to be based on regular and respectful communication between school leaders and the academic team members. All efforts will be made by academic team members to understand and address local community concerns and recommendations at each step of the project.

2. Research Project Description

Overall research goal: This project is designed to examine whether integrated classroom-based physical activity improves on-task behaviour for Aboriginal elementary school children.

3. Research Project Guidelines

This agreement is guided by the following principles:

- i. Maintain mutual respect and accountability between the parties.
- ii. Recognize the expertise, responsibilities, mandates and accountability structures of each party.
- iii. Ensure the highest standards of research ethics.
- iv. Respect the individual and collective privacy rights of Aboriginal Peoples.
- v. Recognize the value and potential of research that is scientifically and culturally validated.
- vi. Recognize the value of capacity building at all levels.
- vii. Support collaborative Aboriginal and University processes including the analysis and dissemination and ownership of research results/reports.
- viii. Understand and observe cultural protocols when working within the community.
- ix. To provide fair treatment to all persons taking part in the research project.

4. Responsibilities

The responsibility for achieving the goal of the project will be shared by the community research partners, the academic partners, and the trainees.

Academic Research Team Member Responsibilities

- Facilitate achieving the goal of the research project.
- Enable and support community participants in obtaining new skills (e.g. research design, implementation and evaluation) and knowledge.
- Adhere to governance protocols and ensure individual and collective community rights are respected.
- Educate themselves about respectful cultural protocols.
- Ensure that results are appropriately returned and disseminated in the community.
- Ensure that any external reports are reviewed and approved by the community authority.
- Ensure the community is informed about the progress of the project in a clear, specific and timely manner.
- Act as a resource to the community on questions related to various portions of the research project.

School Research Team Members (Administration and Teachers)

- Advise research project team.
- Assist in linking research project activities with other community activities as required.
- Recommend capable and reliable community members to collaborate in this project.
- Keep informed about the projects progress.

6. Consent and Confidentiality

Informed consent, according to the guidelines established by the University of Saskatchewan Advisory Committee on Ethics in Behavioural Science Research will be obtained from each participating individual. Participating children and youth will need to obtain informed consent from their parents or caregivers and give their assent to participate.

When seeking informed consent from the parents and caregivers of the children in this study the purpose of the project as well as the potential benefits and any harmful effects of the research on the child will be explained. There will be no pressure placed on a parent or caregiver to have their child participate and it will be made clear that there will be no negative consequences should they choose not to have their child participate. The issue of confidentiality will also be explained, and all parents and guardians will be assured that their child's information will remain private and confidential. Names of participants will also remain confidential.

For the children participating in this study assent will be obtained orally. The children will be told about the study verbally in language appropriate for their age. All children will have a choice whether they participate in the study.

7. Reports and Dissemination

The research team commits to preparing a community report and returning results to the school and community.

The researchers will work together to design appropriate dissemination strategies at

specific stages of the project and at the conclusion of the project. Information and knowledge will be shared in the following ways:

- Conferences, workshops, seminars.
- Community newsletter.
- Story-telling, sharing circles.
- Local radio or newspaper.

Following this, the academic research team members wish to use this research project for the following:

- Utilizing the information obtained from the project for academic development of trainees, and completion of MSc theses and PhD dissertations.
- Publishing articles related to the project.
- Presenting the project in peer-reviewed conferences.

Regardless of where and how the data is disseminated, acknowledgements will reflect details of the research being a joint project, and the schools role in formulating its development and direction.

8. Benefits

The benefits likely to be gained by the school through this research project are:

- Educational:
 - Learning about the effects of physical activity on learning.
 - Learning how short physical activity breaks affect the on-task behaviour of their students.
- Opportunity to implement educational promotion programming relevant to the desires of the community:
 - Assistance in running an in class short physical activity break program that can be continued on after the research process is complete.

9. Data Ownership:

To ensure confidentiality for individual participants in the project, access to all data will be restricted only to those individuals involved in the project. The University of Saskatchewan and Whitecap Elementary School will share ownership of the data, which will be stored in a secure location at the University of Saskatchewan. Data will be stored for a minimum of five years after the study has been completed. The data will not be used for any purpose other than which is outlined for this project without the consent of community representatives.

10. Commitments

We have read this agreement and understand the nature of the project and how it will be carried out. All our questions have been answered satisfactorily. The risks and benefits have been explained. We agree to act according to the principles outlined above.

Appendix G – Operationalized Definitions of On-and Off-Task Behaviour

Defining On-and-Off Task Behaviour for Elementary School Children

On-Task: Verbal, Motor, or Passive Behaviour that follows the class rules and is appropriate to the learning situation.

BEHAVIOUR	DEFINITION	EXAMPLES
On-task Verbal Abbreviation: <u>On V</u>	Any time the student is verbally engaged in the topic being taught.	Asking questions related to their work, talking to others about the work, answering questions.
On-Task Motor Abbreviation: <u>On M</u>	Any time the student is actively attending to the assigned work.	Writing, reading aloud, raising a hand, and leaving their desk for assignment related reasons.
On-Task Passive Abbreviation: <u>On P</u>	Any time the student is passively attending to the assigned work.	Listening to the teacher, looking at their work, listening to a peer talk about the assigned work

Off-Task: Any Behaviour that is not on-task. It can be verbal, motor, or passive.

BEHAVIOUR	DEFINITION	EXAMPLES
Off-task Verbal Abbreviation: <u>Off V</u>	Any audible verbalizations that are not permitted and/or not related to the assigned work or academic task.	Talking to others about unrelated topics, making unauthorized comments or noises
Off-Task Motor Abbreviation: <u>Off M</u>	Any instance of motor activity that is not directly associated with the assigned academic task.	Reading or writing inappropriate or unassigned material, leaving the desk without receiving permission, physically touching other students
Off-Task Passive Abbreviation: <u>Off P</u>	Any time a student is passively not attending to assigned academic activity.	Gazing off, placing his head on the desk, looking at other students when not part of a given assignment

Appendix H – Sample On-Task Data Collection Sheets

DATE:

TIME:

OBSERVER:

CLASS:

Interval length: 10 seconds

Participants	I.1	I.2	I.3	I.4	I.5	I.6	I.7	I.8	I.9	I.10	I.11	I.12	I.13	I.14	I.15
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

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NOTES:

Participants	I.1 6	I.1 7	I.1 8	I.1 9	I.2 0	I.2 1	I.2 2	I.2 3	I.2 4	I.2 5	I.2 6	I.2 7	I.2 8	I.2 9	I.3 0
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

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NOTES:

Appendix I – Accelerometer Data from Study 1 and Study 2

100=Grade four and five non-active lesson period

200= Grade four and five active lesson period

300= Kindergarten and grade one non-active lesson period

400= Kindergarten and grade one active lesson period

ID	Valid Days (days)	Wear Time (hours)	Total PA (minutes)	MVPA (minutes)	VPA (minutes)	MPA (minutes)	LPA (minutes)	Sedentary Time (minutes)
100								
101	3	5.31	165.33	103.42	62.33	41.08	61.92	153.33
102	4	5.64	92.38	30.25	0.81	29.44	62.13	246.31
103	4	5.28	100.88	34.94	2.25	32.69	65.94	215.81
104	3	5.12	183.50	98.17	60.92	37.25	85.33	123.58
105	3	5.46	78.25	27.33	1.33	26.00	50.92	249.17
106	4	5.90	125.63	43.50	3.69	39.81	82.13	228.38
108	4	5.90	101.75	35.13	3.69	31.44	66.63	252.00
109	2	5.36	104.38	28.13	1.38	26.75	76.25	217.25
111	4	5.93	101.00	29.38	2.75	26.63	71.63	254.88
112	1	5.78	102.25	28.50	0.75	27.75	73.75	244.25
113	3	4.80	81.50	28.75	2.58	26.17	52.75	206.50
Mean 100	3.18	5.50	112.44	44.32	12.95	31.36	68.12	217.41
200								
201	1	3.01	25.00	12.25	6.50	5.75	12.75	155.75
203	1	4.89	112.75	39.25	2.25	37.00	73.50	180.75
205	1	4.18	90.50	36.00	1.25	34.75	54.50	160.00
207	4	5.65	100.06	23.88	0.88	23.00	76.19	239.19

209	3	5.90	109.92	30.33	2.17	28.17	79.58	244.25
210	2	3.91	58.50	13.88	0.63	13.25	44.63	175.88
211	1	4.96	109.00	43.50	2.25	41.25	65.50	188.50
212	3	5.58	99.25	24.17	0.25	23.92	75.08	235.42
213	2	5.36	48.00	12.63	1.38	11.25	35.38	273.75
Mean	2.00	4.83	83.66	26.21	1.95	24.26	57.46	205.94
200								
300								
301	2	4.29	87.50	20.75	2.00	18.75	66.75	170.13
302	3	3.89	112.58	33.08	2.83	30.25	79.50	120.92
303	1	6.00	96.75	16.50	1.75	14.75	80.25	263.25
304	1	4.87	72.75	15.00	1.25	13.75	57.75	219.50
305	2	5.50	126.13	48.25	8.88	39.38	77.88	203.75
309	3	4.65	106.42	35.33	3.83	31.50	71.08	172.75
Mean	2.00	4.87	100.35	28.15	3.42	24.73	72.20	191.72
300								
400								
403	4	4.19	70.44	18.00	1.50	16.50	52.44	180.94
404	4	4.42	68.06	16.88	0.75	16.13	51.19	197.13
409	4	5.17	111.56	37.00	4.06	32.94	74.56	198.63
Mean	4.00	4.59	83.35	23.96	2.10	21.85	59.40	192.23
400								

Appendix J – Parent and Guardian Newsletter



Energizing the Brain

Active Body, Active Mind.

A research study with students at Whitecap Elementary School shows that even short physical activity breaks help keep kids on task.

Last winter students in the kindergarten/grade one class and the grade four/five class at Whitecap Elementary School took part in a study that looked at how short physical activity breaks affected their ability to stay on task in the classroom. On task behavior is defined as behavior that follows the class rules and is appropriate for the learning situation.

These short physical activity breaks, called Energizers, not only gave the children five to ten minutes of extra physical activity, they also incorporated material that the students were learning. For example, some Energizers involved math, language arts, and spelling.

The students' on task behavior was measured before and after the Energizers. The results were great! Both classrooms and, almost all students', showed significant increases in their ability to stay on task after doing Energizers.



Did you know?

Physical activity is not only good for your child's developing body, but it is also good for their brain! Physical activity helps a child learn at school and at home, improves behavior and self esteem, and it reduces stress, anxiety, and depression.

I would like to express my gratitude to the teachers and staff at Whitecap Elementary School for welcoming me into their school community and partnering on this project with me. I would also like to thank the students and parents who participated in this study, along with the community leaders who approved the project.

Sincerely,
Serene Kerpan

For more information on this study contact:

Serene Kerpan, PhD Candidate
College of Kinesiology
University of Saskatchewan

Serene.kerpan@usask.ca

Phone: (306) 380 3202



Top 5 reasons why you should get your child and their brain physically active:

- 1.** Moderate to high intensity physical activity (heavy breathing & a little sweating) helps children learn. This includes improving memory, attention, motivation, satisfaction, and test scores.
- 2.** Physical activity reduces depression and anxiety in children and teens.
- 3.** Active children have better self-esteem.
- 4.** Kids who get regular physical activity are better able to regulate their behavior.
- 5.** Children who get daily physical activity sleep better, and sleep is critical for a child's developing mind.



For more information on getting your kids active visit:
<http://www.saskatchewaninmotion.ca>

Appendix K – Energizers Activities for Study 1

Variations to the *Energizer* activity that were developed by the researcher and/or teacher for the purpose of this study are in italics.

Factor It In

Rules/Directions:

1. Students are divided into 4 groups and each group is sent to a corner of the room. Four pieces of scrap paper labeled 2, 3, 4, and 5 are placed in each corner.
2. Teacher calls out a number that is a multiple of 2, 3, 4, or 5.
3. Students who are in a corner that is a factor of that number will move to another corner.
4. Movements include:
Jumping
Skipping
Walking
Hopping on one foot
Marching
5. Example – If teacher calls out 6, students in corners 2 and 3 will move to another corner.

Variation:

1. Have students move to a corner labeled with a factor of the number called. If a prime number is called, have students move to center of room.

Frozen Vocabulary

Rules/Directions:

1. Begin by having students do an activity standing at their desks: Jumping, Twisting, Jogging, Jumping jacks, Hopping, Knee lifts, Play air guitar.
2. Students continue activity until teacher calls out a vocabulary word at which point the students freeze.
3. Teacher calls on volunteer to use the vocabulary word properly in a sentence.
4. Resume activity or begin a new activity when a student uses the vocabulary word properly in a sentence.

Variations:

1. Students can define vocabulary word.
2. Students can spell the word.
3. Students can name a synonym or antonym.
4. For math, students can give the sum, difference, or quotient of 2 numbers.
5. *Frozen grammar- students have to determine whether a word is a verb or noun.*

Heart Smart

Rules/Directions:

1. Teacher calls out a habit that strengthens or weakens the heart.
2. If the habit strengthens the heart, students will respond by jumping.
3. If the habit weakens the heart, students will respond by falling down or squatting.

Riding a bike – jump

Eating 4 pepperoni pizzas – fall

Walking your dog – jump

Smoking cigarettes – fall

Never going outside to play and watching TV all the time – fall

Dancing with your friends – jump

Skating – jump

Never eating fruits/vegetables – fall

Riding a scooter – jump

Shooting baskets – jump

Playing PlayStation – fall

Eating fast food – fall

Raking the leaves - jump

Washing the car – jump

Taking the stairs – jump

Taking the elevator – fall

Swimming – jump

Eating potato chips and Twinkies – fall

Variation:

1. Have students think of their own habits.

Memory LaneRules/Directions:

1. Teacher calls out one task at a time and partners complete that task.
2. Tasks should be called out in the order provided.

High five right

High five left

Low five right

Low five left

High ten

Low ten

Backwards ten high

Backwards ten low

Sole of shoes right

Sole of shoes left

Elbow right

Elbow left

3. Partners repeat the tasks beginning with the first task each time.

4. Have students repeat sequence as fast as they can with accuracy.

Stop and ScribbleRules/Directions:

1. Teacher calls out physical activity:

Jumping

Twisting

Jogging

Jumping jacks

Hopping

Knee lifts

Playing air guitar

Marching

2. Students begin activity and continue until the teacher calls out a spelling word.

3. Students freeze and partners work together to try to spell the word correctly on a piece of paper.

4. After 10 to 15 seconds, teacher calls out new activity.

5. Continue until all spelling words are used.

5. As students cool down, teacher will write correct spelling on board and students will check their work.

6. Variation: Same activity using sidewalk chalk instead of paper and pencil (outside).

Make it a team competition for classroom rewards.

LitterboxRules/Directions:

1. Have partners ball up a piece of paper and place it on the floor.
2. Ask the partners to pick up the paper using body parts called by the teacher:
Elbow and elbow
Foot and foot
Knee and knee
Forearm and elbow
Foot and elbow
Knee and elbow
Forehead and back of hand
Toe and finger
3. Students can place the paper ball back on their desks, or move it to other parts of the room.

Variations:

1. Each student can have his or her own paper ball and play individually.
2. Could be done as a team relay, where students hop around their desks with the paper ball between the body parts and pass the paper ball to the next teammate. The last person hops to the trashcan and puts the paper ball in the trashcan.
3. *Have students write answers to question about current content being taught on the paper first, then ball it up and do the activity. Recognize the teams who were the first to complete the task of getting the ball to the bin, but also those who got the answers correct.*

Silent SignsRules/Directions:

1. Teacher chooses 1 student to go to the map.
2. Teacher chooses location (state or country) and tells everyone in the class except the student at the map (can write location on board or piece of paper).
3. Class uses movement without talking to guide the student to the correct location.

East: knee lifts

West: jumping jacks

North: raise the roof

South: squats

4. Repeat with new location and new student.

Variations:

1. Post the direction that corresponds to each movement on the board.
2. *Use left and right to help students who do not know directions yet.*

Spelling TagRules/Directions:

1. Teacher hands out a piece of paper to each student, with half getting one color and the other half getting another.
2. Students write spelling list on the piece of paper, while teacher writes an activity on the board:

Jumping jacks

Marching

Knee lifts

Scissors (feet apart then cross in front, feet apart then cross in back)

Hopping

Twisting

3. Students will help each other tape spelling lists to backs of shirts.
4. Students divide into 2 groups based on color of paper.
5. On signal, students will circulate and select a partner with another color.
6. When selected, the student will pick a word from the spelling list and request that the other student spell that word.
7. While spelling, the student will perform the activity written on the board.
8. Partner checks the back of the other student's shirt to make sure the word was spelled correctly.
9. Teacher can change activity on the board as desired.

Variations:

1. Reduce spelling list to limit time of activity.
2. Students can write vocabulary list and definition instead of spelling words.

Hit the DeckRules/Directions:

1. Teacher places deck of cards in front of the class.
2. Have one student select a card and students will do the corresponding activity for each suit.

3. Would be helpful to write corresponding activities on the board for each suit:

Heart: touch elbow to knee or crunches for 20 seconds

Diamond: jog in place or march in place for 20 seconds

Club: modified push up or cabbage patch for 20 seconds

Spade: jumping jacks or scissors (feet apart then cross in front, feet apart then cross in back) for 20 seconds

4. Provide other students opportunity to pick a card from the deck and repeat activity.

Suggestions:

1. Place activities on chart paper so that activity can be done outside.
2. Choose 3 or 4 cards of each suit instead of using entire deck to save time.
3. *Make it a team competition for classroom rewards.*

Sports GaloreRules/Directions:

1. Teacher calls out the following sports skills to mimic:

Shooting a jump shot

Running through tires

Batting a baseball

Serving a tennis ball

Downhill skiing

Spiking a volleyball

Swinging a golf club

Throwing a football

Juggling a soccer ball

Shooting an arrow

Shooting a hockey puck

Swimming underwater

Fielding a ground ball and throwing it to first base

Dunking a basketball

2. Teacher can also integrate skills into word problems and have students repeat the number he or she calls out:

If Juan made 5 jump shots and 2 went in the basket, how many did he miss? (3)

If Briana hit 2 homeruns, how many bases would she have to touch? (8 bases)

Appendix L – Energizers Activities for Study 2

Variations to the *Energizer* activity that were developed by the researcher and/or teacher for the purpose of this study are in italics.

Over, Under, Around, and Through

Rules/Directions:

1. Teacher decides on a pattern where students go over, under, around and through imaginary or real objects.

2. Lead the line of students around the room, following this pattern.

Example 1 – Over a sea of sticky peanut butter, under a cherry tree, around an ice cream cone, and through a sea of Jell-O.

Example 2 – (geography) Over a turtle, under a big dog, around the elephant and through a giraffe's legs.

Over: Steep mountain, wiggly bridge, ocean, lake, thorny bush.

Under: Dog, water, limbo stick.

Around: Large rock, desk, chair, circle, trash can, campfire

Through: Deep dark cave, creaky door, long tunnel, window, swamp, swimming pool

Variations:

Make items reflective of the place in which the children live

Use items in the classroom to safely build structures to go over, under, around and through.

Pass It On

Rules/Directions:

1. Teacher hands out one card to each student.

2. Students identify color on card and perform activity that corresponds to that color for 10 – 15 seconds:

Blue: jump to the sky

Red: squats

Yellow: twist

Green: swim

3. When teacher says, "Pass it On", students will pass the card to the person on their right and complete the activity that corresponds to their new cards.

Variations:

1. Teach colors in another language.

2. Use different physical activities to make the game more challenging.

As IfRules/Directions:

1. Teacher reads sentence to class:

Jog in place **as if** a big scary bear is chasing you

Walk forward **as if** you're walking through chocolate pudding

Jump in place **as if** you are popcorn popping

Reach up **as if** grabbing balloons out of the air

March in place and play the drums **as if** you are in a marching band

Paint **as if** the paint brush is attached to your head

Swim **as if** you are in a giant pool of Jell-O

Move your feet on the floor **as if** you are ice skating

Shake your body **as if** you are a wet dog

2. Students act out each sentence for 20 – 30 seconds.

Variation:

1. Students may create their own sentences for additional activities.

WigglesRules/Directions:

1. Jog in place while doing the following activities.

2. On teacher's signal, the students begin to wiggle their fingers.

3. Then their fingers and wrists.

4. Then their fingers, wrists, and forearms.

5. Then their fingers, wrists, forearms, and elbows.

6. Then their fingers, wrists, forearms, elbows, and shoulders.

7. Then their fingers, wrists, forearms, elbows, shoulders, and rib cage.

8. Then their fingers, wrists, forearms, elbows, shoulders, rib cage, and hips.

9. Then their fingers, wrists, forearms, elbows, shoulders, rib cage, hips, and knees.

10. Then their fingers, wrists, forearms, elbows, shoulders, rib cage, hips, knees and head.

Variations:

1. Start from toes and work your way up (toes, knees, hips, etc.).

2. Repeat activity without jogging as cool down.

Stop, Drop, and RollRules/Directions:

1. On teacher signal, the students begin to move around the room.

2. When someone yells "FIRE", the students stop, drop, and roll.

3. Yell "Fires out!" and begin again.

4. Continue for 3 – 4 minutes.

5. Next, teacher calls out, "When the heats up high." Students respond, "You get down low," and squat down to the ground to avoid smoke (students can also crawl toward imaginary exit).

6. Students immediately stand back up and teacher begins again.

On the FarmRules/Directions:

1. Teacher will call out various farm animals:

Pig

Cow

Chicken

Horse

Rooster

Sheep

Dogs

2. Students will mimic the farm animal (sounds and movement) until teacher calls out a new farm animal.

Variations:

1. Play "Old McDonald" as background music.

Morning StretchRules/Directions:

1. Have students begin the day with a series of simple activities lasting 30 seconds or more:

Jumping jacks

Knee lifts

Flap arms like a bird

Hopping

Scissors (feet apart then cross in front, feet apart then cross in back)

2. Follow each activity with a basic stretching movement:

Reach for the sky

Runner's stretch

Butterfly stretch (sit with bottom of feet together)

Knee to chest

Rotate ankles

Scratch your back

3. Hold stretches for 10 – 30 seconds.

4. Repeat a different simple activity followed by a new basic stretch as many times as desired.

Variation:

1. Do the stretches at any point in the day

Air WritingRules/Directions:

1. Students begin by moving in place or around the room:

Jumping

Marching

Hopping

Twisting

2. Teacher calls out letter, number, word or shape and students stop activity.

3. Students will draw the letter, number, word or shape in the air using their hand, arm, leg, head, elbow, knee, bottom or any combination of body parts until teacher calls out another activity.

4. Students continue new activity until teacher calls out another letter, number, word or shape.

It's a Zoo in HereRules/Directions:

1. Teacher selects an animal or has students select an animal:

Monkey

Bear

Snake

Elephant

Giraffe

Kangaroo

Lion

Tiger

2. Students must imitate the way the animal walks or moves beside their desks or around the classroom.

3. Students continue until teacher signals to move like the next animal.

Variations:

1. Make cards with animal names to use as flash cards (Grades 1-2).

Children can read the names and act them out.

2. Use pictures of animals for Grades K-1.